THE

JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

[REGISTERED AS A NEWSPAPER.]

VOL. XXVI. No. 651.] LONDON, NOVEMBER 2, 1875. [27TH YEAR.] Price 6d.

RAMSAY'S NEWCASTLE CANNEL COAL. Analysis—10,000 cubic feet of gas per ton of coal; 26-candle gas; 13¼ cwt. coke per ton of coal.
The London Exhibition in 1851 was lighted with gas made from Ramsay's Cannel.
RAMSAY'S PATENT CONDENSED COKE.
DO. GARESFIELD COKE.

RAMSAY'S FIRE-CLAY ARTICLES.
GAS-RETORTS, introduced 1828. FIRE-BRICK WORKS, established 1804. FIRE-CLAY SANITARY PIPES, CHIMNEY-TOPS, and all Goods made of Fire-Clay. The Fire-Clay is worked from Blaydon Main Colliery, is of excellent quality, and no expense spared in perfecting every article. The FIRE-BRICKS (marked "RAMSAY") are to be seen in all parts of the world, and the Works are the most extensive in the Kingdom.
Manufactories—Derwenthaugh, Swalwell, and Hebburn Quay, near Newcastle-on-Tyne; and London Wharves—Falcon Wharf, No. 80, Bankside; and Honduras Wharf, Cubitt Town. Large stocks kept.
Address G. H. RAMSAY, NEWCASTLE-ON-TYNE.

GENUINE TORBAY PAINT
AND
SPECIAL GASOMETER PAINT
(Mixed ready for use).
These Paints are now used in 100 Country Gas-Works, and by all (but one) of the London Gas Companies, on Gasholders, Scrubbers, Purifiers, &c. They will cover tar effectually. Also used by the Admiralty, War Office, Railway Companies, Founders, &c.
They prevent and arrest rust, and protect iron from the action of water, sulphurous and gaseous exhalations.
The covering powers are considerably greater than those of any other Paint.—*See "Engineer," Nov.* 2, 1866.
STEVENS & CO.,
(SUCCESSORS TO SAMUEL CALLEY. ESTABLISHED 20 YEARS.)
21, GT. WINCHESTER ST., LONDON.
WORKS: BRIXHAM, TORBAY.

PROUD'S
SPECIALITIES IN WOOD GRIDS
FOR
PURIFIERS & SCRUBBERS
MADE FROM THE BEST QUALITY
OF
WELL-SEASONED PLANKS.
SCRUBBERS FITTED WITH MR. LIVESEY'S BOARDS AT MODERATE COST.
BROOKFIELD WORKS,
103, ICKNIELD STREET EAST, BIRMINGHAM.

COWEN'S PATENT FIRE-CLAY RETORTS.
JOSEPH COWEN and CO.,
BLAYDON BURN, BLAYDON-ON-TYNE,
Were the only parties to whom a PRIZE MEDAL was awarded at the GREAT EXHIBITION of 1851, for "GAS-RETORTS and OTHER OBJECTS in FIRE-CLAY," and they were also awarded at the INTERNATIONAL EXHIBITION of 1862, the PRIZE MEDAL for "GAS-RETORTS, FIRE-BRICKS, &c., for EXCELLENCE of QUALITY."
J. C. and Co. have been for many years the most extensive Manufacturers of Fire-Clay Retorts and Fire-Bricks in the Kingdom. Orders for Fire-Clay Retorts of all shapes and dimensions, and to fit any shaped Mouthpiece, Fire-Bricks, and every other article in Fire-Clay, are promptly executed at their Works as above.
COWEN'S GARESFIELD COALS.
Coal Office,
QUAY SIDE, NEWCASTLE-ON-TYNE.
JOS. COWEN & Co. are the only Manufacturers of FIRE-BRICKS and CLAY RETORTS at BLAYDON BURN.

JOHN RUSSELL AND CO.,
THE WEDNESBURY TUBE WORKS, WEDNESBURY;
AND
THE ALMA WORKS, WALSALL.
Established at the commencement of Gas Lighting.
WAREHOUSES:
69, UPPER THAMES STREET;
COMMERCIAL STREET, SPITALFIELDS;
5, CHARLES STREET, SOHO; and
16, SOHO SQUARE,
} LONDON
35, 36, 37, & 39, GRANBY ROW, MANCHESTER.
J. R. and Co. are the original manufacturers of Wrought-Iron Gas Tubes and Fittings, and Inventors of the LAP-WELDED TUBES for Locomotive and Marine Boilers.
J. R. and Co. make all kinds of Tubes and Fittings for Gas, Steam, and Water; Gun-Metal Cocks, Stocks, and Dies; Galvanized Tubes and High-Pressure Tubes, &c.
Lists may be obtained on application to
69, UPPER THAMES STREET, LONDON.

JOHN BENT & SON,
BELL BARN ROAD, BIRMINGHAM,
MANUFACTURERS OF
WET AND DRY GAS-METERS,
OF
FIRST-CLASS MATERIALS & WORKMANSHIP;
Also, STATION-METERS, PRESSURE-GAUGES, STREET-LAMPS, REGULATORS, &c.
ESTABLISHED 1830.

THOMAS PIGGOTT & CO.,
SPRING HILL, BIRMINGHAM.
MANUFACTURERS OF
TELESCOPIC & SINGLE GASHOLDERS,
CAST & WROUGHT IRON TANKS FOR DITTO,
And Gas Apparatus of every Description.
Marine, Tubular, Cornish, Plain, Furnace, Saddle, and Range Boilers.
SUGAR, SALTPETRE, AND ALL KINDS OF PANS.
Roofs, Girders, and Bridges, and General Smith's Work.
LONDON AGENT—W. G. DAVIS, 2, Brabant Court, Philpot Lane, E.C.

J. & H. ROBUS,
CONTRACTORS
FOR THE
ERECTION OF NEW & REMODELLING OF EXISTING GAS-WORKS.
RETORT-SETTING A SPÉCIALITÉ.
RETORTS SET, AND GUARANTEED TO BURN OFF A CERTAIN AMOUNT OF COAL, OR ELSE NO MONEY TAKEN FOR THE CONTRACT.
PLANS ON APPLICATION.
Retort-Setters sent to all parts of Europe and America.
Address, J. and H. ROBUS,
BELL GREEN, CATFORD, LONDON, S.E.

THE
NITSHILL COMPANY'S
DUKE OF HAMILTON'S
LESMAHAGOW
CANNEL COAL.
AGENT:
JAMES M'KELVIE,
HAYMARKET,
EDINBURGH.

GEORGE GLOVER & CO.,

MANUFACTURERS OF

IMPROVED DRY GAS-METERS,

WARRANTED TO MEASURE CORRECTLY, AND NOT TO VARY.

EXTENSION OF PREMISES.

G. G. & Co. having had their premises entirely rebuilt, are now fairly in possession of large and commodious workshops, specially adapted to the requirements of the trade, and they are prepared to execute orders, large or small, with promptness and despatch.

THEY KEEP IN STOCK METERS OF ALL SIZES, UP TO 300 LIGHTS.

RANELAGH WORKS, RANELAGH ROAD, PIMLICO,
LONDON, S.W.;
236, GEORGE STREET, GLASGOW; and 30, LANCASTER AVENUE, MANCHESTER.
AGENT FOR AUSTRALIA:
Mr. A. DEMPSTER, POST-OFFICE PLACE, MELBOURNE.

G. G. & Co. have just been awarded a SILVER MEDAL for Gas-Meters and Gas Apparatus at the Exhibition of the "Society for the Promotion of Scientific Industry," Manchester.

SILVER MEDAL, PARIS EXHIBITION, 1867.

LLOYD AND LLOYD,

ALBION TUBE-WORKS, BIRMINGHAM,

MANUFACTURERS OF

WROUGHT-IRON TUBES AND FITTINGS

AND

LAP-WELDED IRON AND HOMOGENEOUS METAL BOILER TUBES.

Boiler-Tube Ferrules, Gun-Metal Gland Cocks, Water-Gauges, Whistles, &c.; Stocks, Taps, and Dies for Screwing, and Gas-Fitters Tools.

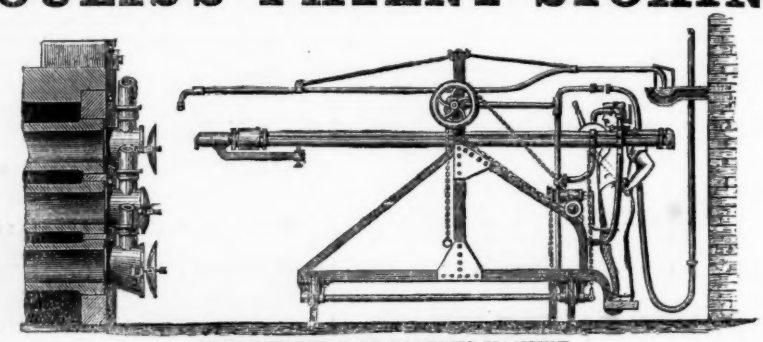
London Offices: No. 4, Cloak Lane, Queen Street, E.C.

WAREHOUSES:

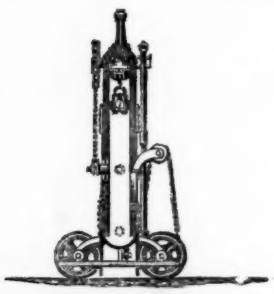
LONDON: 157, UPPER THAMES STREET, E.C.

LIVERPOOL: No. 63, Paradise Street.
MANCHESTER: Barlow's Croft, Chapel Street, Salford.
PARIS: No. 38, Rue du Chateau d'Eau.
LILLE: No. 38, Rue Grande Chaussee.

FOULIS'S PATENT STOKING MACHINE.



SIDE ELEVATION OF DRAWING MACHINE.



END ELEVATION.

(*The Charging Machine will be Illustrated in next week's Advertisement.*)

Makers: TANGYE BROTHERS and HOLMAN, London and Birmingham; ADAM WOODWARD and SON, Manchester; ROBERT LAIDLAW and SON, Glasgow; MASCHINENBAU-ACTIEN-GESELLSCHAFT HUMBOLDT, Kalk bei Deutz;
Or all particulars may be had from JAMES WOTHERSPOON, 31, St. Vincent Place, Glasgow.

Established

1795.

JOSEPH CLIFF & SON,

THE ORIGINAL

WORTLEY FIRE-BRICK WORKS,

NEAR LEEDS,

MANUFACTURERS OF ALL DESCRIPTIONS OF

FIRE GOODS, and Salt-Glazed Drain-Pipes.

LONDON WHARF:

Wharf No. 4, inside Great Northern Goods Station, King's Cross, N.;

LIVERPOOL—1, Back Leeds Street,

Where is always kept a Stock of Retorts, Fire-Bricks, Terra Cotta Ware, and Drain-Pipes.

TRADE MARK

THE MEDAL FOR 1862.

The only Prize Medal awarded for TUBES & FITTINGS.

CROWN TUBE-WORKS,

WEDNESBURY, STAFFORDSHIRE.

WAREHOUSE: SOUTHWARK STREET, LONDON.

JAMES RUSSELL & SONS, LIMITED,

PATENTEES & FIRST MAKERS OF WROUGHT-IRON TUBES,

ONLY MAKERS OF HOMOGENEOUS METAL TUBES.

MANUFACTURERS OF

TUBES and FITTINGS for GAS, STEAM, and WATER;

LAP-WELDED, LOCOMOTIVE, MARINE, and other BOILER TUBES;

HYDRAULIC TUBES, BEDSTEAD TUBES, WELL TUBES, TELEGRAPH POSTS, COILS, &c.;

GAS-FITTERS TOOLS, VALVES, COCKS, &c.

THOMAS PIGGOTT & CO.,

(Established 1822,)

SPRING HILL, BIRMINGHAM.

MANUFACTURERS OF

TELESCOPIC & SINGLE GASHOLDERS,

CAST & WROUGHT IRON TANKS FOR DITTO;

PURIFIERS, CONDENSERS, SCRUBBERS, RETORTS, VALVES;

IMPROVED WROUGHT-IRON RETORT-LIDS, CROSS-BARS, & SCREWS;

AND GAS APPARATUS OF EVERY DESCRIPTION.

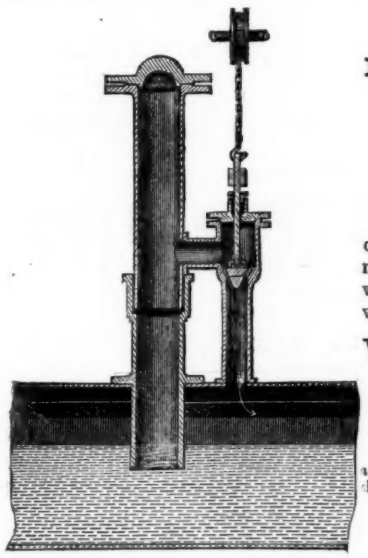
SOLE MANUFACTURERS OF LIVESEY'S PATENT GASHOLDER MAN-LID,

By use of which Man-lid, inlet and outlet pipes can be examined and cleansed without loss of gas in crown of holder, or ingress of atmospheric air.

ROOFS, GIRDERS, BRIDGES, AND BOILERS OF ALL KINDS.

Drawings, Specifications, and Estimates supplied on application.

London Agent: W. G. DAVIS, 2, BRABANT COURT, PHILPOT LANE, E.C.



COPP'S PATENT GAS APPARATUS

For the Removal of all Pressure caused by the Hydraulic Seal;

THE EFFECTS PRODUCED BEING

1.—A LARGE INCREASE IN THE YIELD OF GAS.

2.—AN ENTIRE PREVENTION OF THE DEPOSIT OF CARBON.

3.—THE ASCENSION-PIPES DO NOT CHOKE.

The apparatus is very simple in construction, and cannot get out of order, and being an outside addition to the present arrangement of works, can be applied so easily as to require no alteration of plant. It may be fitted whilst the retorts are in use, without interfering with the manufacture of gas. The cost is so small that the outlay will be repaid in a few weeks' working. For further particulars apply to the Patentee,

W. L. COPP, WATCHET GAS-WORKS, SOMERSET,

or, 232, BRIXTON ROAD, LONDON, S.W.

The Watchet and Williton Gas Company, Watchet, Somerset.

This is to certify that we have had Mr. W. L. Copp's Patent Anti-Dip Valves in work for six months, and that it has given an average increase yield of over one thousand feet of gas per ton of coals, and that the patent apparatus has in every respect given us the greatest satisfaction.

Given under the Seal of the Company, this 6th day of October, 1875.

JOHN THORNE, Chairman.

Many similar Testimonials will be forwarded on application to the Patentee.

SIDNEY LEONI & CO.,

GAS ENGINEERS,

Patentees and Manufacturers of Registered Apparatus for Cooking and Heating by Gas, Complete Kitcheners for Families, Hotels, Clubs, &c. Ovens for Baking and Roasting. Grillers for Broiling. Boilers and Steamers for general use. The New Patent Tubular Safety Gas Boiler; also Heating and Ventilating Stoves, besides other Culinary and Warming Apparatus of their invention, and for which they have been awarded Prize Medals in 1871, 1872, 1873, and 1874.

They have also just been awarded by the Jurors of "The Exhibition of Appliances for the Economy of Labour," now being held at Manchester, the

GOLD MEDAL

For their collection of Patent Atmospheric Gas Apparatus, comprising New Patent Kitcheners for Roasting, Baking, &c., Steamers, Bath Boilers, Heating and Ventilating Stoves, Ornamental Drawing and Dining-room Fire Grates, and other Gas Apparatus, for their novelty, design, workmanship, and utility.

For Pamphlets on the "Advantages of Cooking and Heating by Gas," and Price Lists, &c., apply at the

Adamas Works, 54 to 66, ST. PAUL'S ST., NEW NORTH RD., LONDON, N.

London Depot: 74, STRAND, ADELPHI, W.C.,

Sole Licensees and Agents in Great Britain for

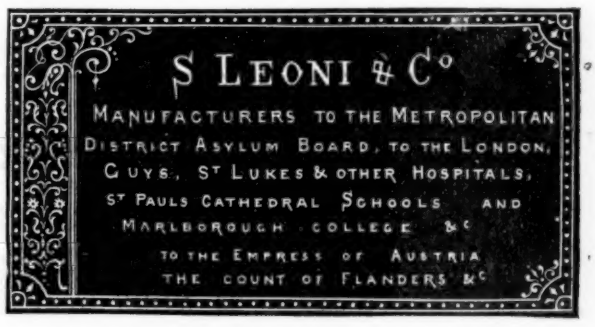
GIROUD'S PATENT RHEOMETER.

This Instrument is easily fixed under any burner; it regulates the volume of gas to be consumed, notwithstanding the size of the burner or the variations of pressure.

PRIZE MEDALS, 1862, 1867, 1871, 1874, 1875.

SOLE AGENTS and MANUFACTURERS of LOOKER'S PATENT WARMING and VENTILATING GAS-STOVES.

(Special Illustrations and Prices on application to our Works.)


S LEONI & Co
MANUFACTURERS TO THE METROPOLITAN
DISTRICT ASYLUM BOARD, TO THE LONDON,
GUYS, ST LUKES & OTHER HOSPITALS,
ST PAULS CATHEDRAL SCHOOLS AND
MARLBOROUGH COLLEGE &c
TO THE EMPRESS OF AUSTRIA
THE COUNT OF FLANDERS &c

THE

IMPERIAL METER COMPANY,

LIMITED,

KING'S ROAD, LONDON, N.W.,

OFFICE: 9, VICTORIA CHAMBERS, WESTMINSTER, S.W.,

MANUFACTURERS OF

"WET" & "DRY" GAS-METERS IN IRON & TIN-PLATE CASES,

STATION-METERS AND GOVERNORS, STREET-LAMP METERS, BOXES, AND REGULATORS FOR THE AVERAGE METER SYSTEM.

TO GAS COMPANIES, ENGINEERS, &c.

These Works are in full operation, and it will be the aim of the New Company not only to keep up the excellent workmanship of their predecessors, but, by the introduction of special machinery, to manufacture **Meters of a higher standard than is usually given, without increasing the cost.**

Special attention is invited to the Compensating Wet Gas-Meter of De Castro and Burton, which is now becoming so generally adopted, and is more simple in construction than any other Compensating or Ordinary Wet Meter. There is but one centre of friction to be overcome by the gas. By its self-adjusting principle it maintains an unvarying water-line; and the reservoir contains sufficient water to supply the Meter for twelve months without attention. It is unaffected by "tilting," and cannot be "flooded" by any pressure.

The Company also manufacture Dry Meters upon the most improved principle, and all their Meters being made to standard gauges, the most accurate measurement is obtained.

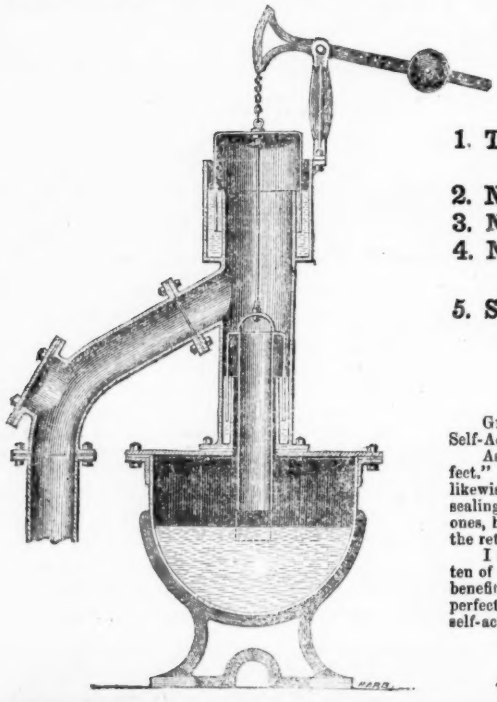
Attention is also called to their Dry Meters in Wood Cases, as used by some of the London Gas Companies. These Cases are a great preservation to Tin-plate Meters, especially in seaport towns, where the air is impregnated with salt; they are also particularly suited for export.

The Company repair or convert every description of Wet Gas-Meters to De Castro and Burton's Patent.

SELF-ACTING REMOVABLE DIP-PIPE,

PATENTED BY

CHANDLER & STEVENSON.



ADVANTAGES.

1. There is no pressure on the Retorts.
2. No deposit of Carbon.
3. No scurfing is required.
4. Never a choked Ascension-Pipe.
5. Saves Fuel and Wear and Tear.
6. Gets 10 per cent. more Gas out of the Coal, and a higher Illuminating Power.
7. Is never out of order.
8. Requires no attention.
9. Is perfectly automatic in its action.

TESTIMONIAL.

Metropolitan District Asylum, Caterham, Surrey, Dec. 14, 1874.

MESSRS. CHANDLER AND STEVENSON.

GENTLEMEN,—I have much pleasure in bearing testimony to the complete working of your "Patent Self-Acting Dip-Pipes," which have now been in constant operation over three months.

As regards the action of the apparatus, I can describe it no better than by calling it "simply perfect." Immediately the retort is charged and the lid secured, the small holder rises, which lifts the Dip; likewise the instant the gas is permitted to escape at the mouthpiece the holder falls, thus perfectly sealing the Dip. I am fully convinced of the superiority of these Self-Acting Dips over Non Self-Acting ones, having experienced the fact that stokers do occasionally neglect to unseal the Dip after charging the retort, thereby causing a waste or loss.

I feel that it is quite unnecessary for me to say more on the subject, excepting that, having had ten of Messrs. Chandler's Dip-Pipes in use more than one year, and having experienced the great benefits derived thereby, inasmuch as the yield of gas from the coal is greatly increased, and the retorts perfectly free from carbon and other advantages, and seeing that the same Dip has been made perfectly self-acting by the second patent, I feel convinced that this is the right thing.—Yours obediently,

W. CRICKMAY, Resident Engineer.

For terms of use and cost, apply to Mr. G. W. STEVENSON,

4, WESTMINSTER CHAMBERS, VICTORIA STREET, S.W.

MESSRS. CHANDLER & SONS,

Gas Engineers, Patentees, and Contractors, Triennial Contractors to Her Majesty's Government,

UNDERTAKE THE

ERECTION OF GAS OR WATER WORKS;

CONTRACTORS FOR PIPE-LAYING AND GAS-FITTING.

SOLE MANUFACTURERS OF THE CHANDLER AND STEVENSON PATENT SELF-ACTING DIP-PIPE.

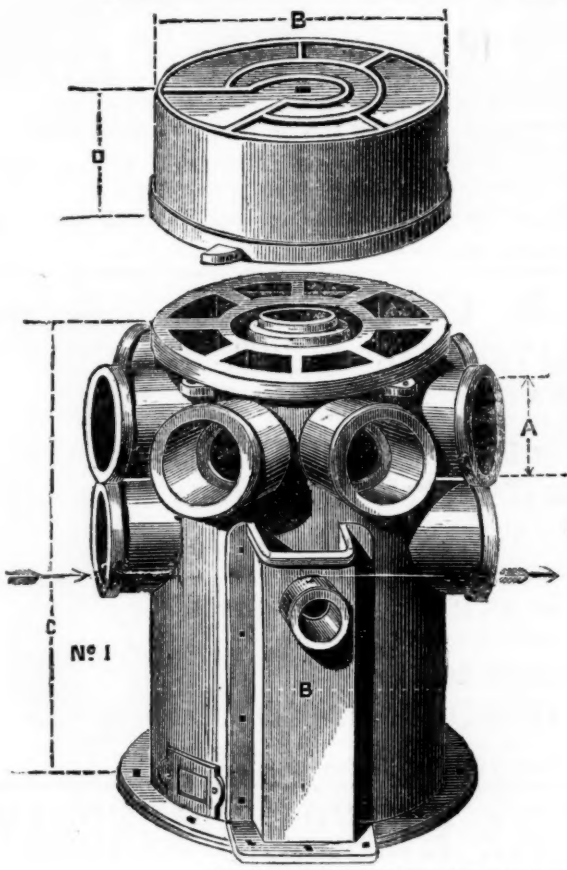
ESTIMATES FURNISHED FOR EXTENSIONS OR ALTERATION TO EXISTING WORKS.

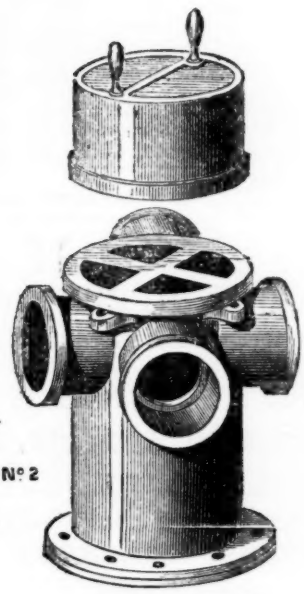
ADDRESS: 26, YORK STREET, SOUTHWARK, LONDON, S.E.

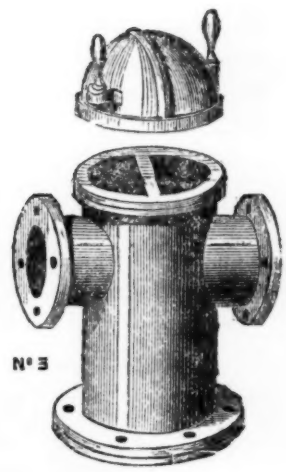
MESSRS. NEWTON, CHAMBERS, & CO.,

THORNCLIFFE IRON-WORKS, NEAR SHEFFIELD.

IMPROVED CENTRE-VALVES.







THORNCLIFFE
IMPROVED BYE-PASS VALVE.
SIZES FROM 3 INS. UPWARDS.

THORNCLIFFE
IMPROVED STOP-VALVE.
SIZES FROM 3 INS. UPWARDS.

Sizes of the THORNCLIFFE IMPROVED CENTRE-VALVE.

	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.
A. Bore of Pipe. . .	4 ..	5 ..	6 ..	7 ..	8 ..	9 ..	10 ..	12
B. Diameter of Body.	16 ..	20 ..	23 ..	26 ..	28 ..	31 ..	34 ..	40
C. Height of Tank .	33 ..	35 ..	38 ..	43 ..	46 ..	48 ..	51 ..	56
D. Depth of Cover .	8 ..	9 ..	10 ..	11 ..	12 ..	13 ..	14 ..	16
Total Height . .	44 ..	44 ..	48 ..	54 ..	58 ..	61 ..	65 ..	72

In all cases the Covers are cast heavy enough to resist any required pressure.

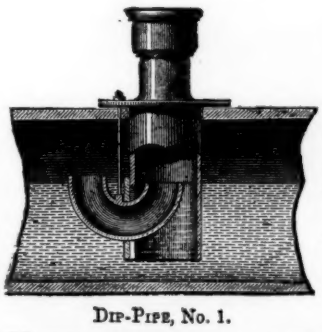
The advantages derived from the adoption of these Valves are so manifest and cardinal that in the immediate character of the change—the simplicity of the machine—the facility affording for cleaning out connexions between Valve and Purifier—the perfect collection and delivery by suitable overflow of the ammonia, at a greatly diminished depth from ground-line over the old form of Valve—the advantage of connecting on the same level, and at any angle, or opposite to each other, the inlet and outlet pipes without dip or rise—the clear acquisition of space in the purifying-house, by being able to place the boxes nearer together, the new Valve being entirely under the floor—and lastly, though of the greatest importance, the passage of crude and unpurified gas during the change is minimized to the merest fraction, thus preventing the fouling by impure gas the delicate machinery and easily affected exposed movements of the station-meter, thereby preventing the introduction of the enemy (unpurified gas) into the gasholder. Also a dead abutment is offered to all back pressure, imparting thereby to the gauges, governors, and hydraulic seals, a steadiness of action never realized with the once famous, but now fast becoming obsolete, Hydraulic Centre-Valve.

N., C., and Co. also Manufacture and Erect

PURIFIERS, CONDENSERS, SCRUBBERS, GASHOLDERS, ROOFS,

And every description of Gas Machinery.

TENDERS GIVEN FOR WORK FIXED COMPLETE IN ANY PART OF THE KINGDOM.



DIP-PIPE, No. 1.

Messrs. N., C., and Co. are also the Sole Agents for

HAWKINS' PATENT SELF-ACTING HYDRAULIC DIP-PIPES.

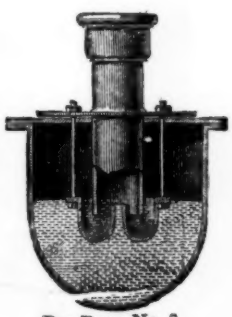
By their use the whole of the pressure caused by the Seal in the Hydraulic Main is entirely avoided, thus securing the many advantages long sought for.

Over 50 Gas Companies have already been supplied with them, many of which have been using them throughout their entire works continuously for over two years.

They can be applied to existing Hydraulic Dips, and at a very small cost.

They seal themselves in the same manner as the ordinary dip-pipes, therefore they are not likely to get out of repair.

By the aid of the adjusting screws they can be made to work on the old principle at pleasure.



DIP-PIPE, No. 2.

FOR PRICES, TESTIMONIALS, &c., APPLY TO

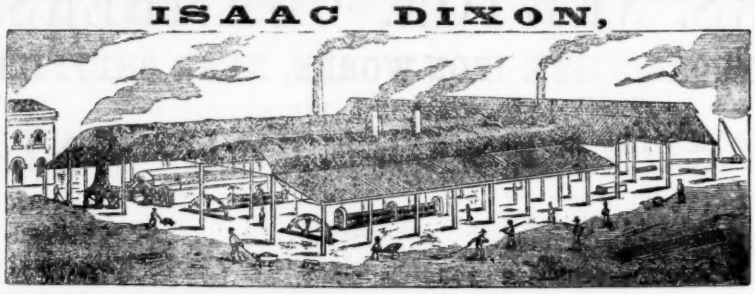
Messrs. NEWTON, CHAMBERS, & CO., Thorncliffe Iron-Works, near Sheffield, Sole Agents;

OR TO THE PATENTEE,

J. G. HAWKINS, NEEPSEND GAS-WORKS, SHEFFIELD.

ISAAC DIXON,

WINDSOR IRON-WORKS, LIVERPOOL.



LONDON OFFICES: 60, QUEEN VICTORIA ST., E.C.

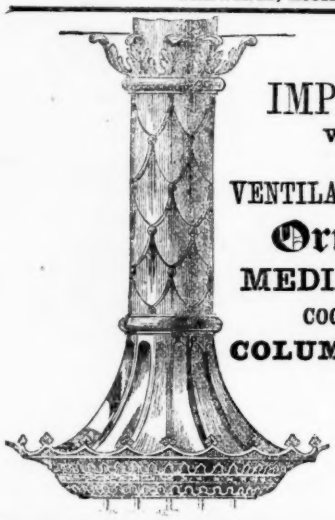
Manufacturer of SELF-SUPPORTING GALVANIZED CORRUGATED, CURVED, and every kind of IRON ROOFING, CHURCHES, SCHOOLS, SHEDS, and IRON BUILDINGS.

WROUGHT and CAST IRON GIRDERS, BRIDGES, TANKS, &c., and all kinds of WIRE WORK, FENCING, GATES, HURDLES, &c., for Home or Abroad.

DIXON'S CELEBRATED SELF-SUPPORTING IRON ROOFS are specially suitable for Forges, Rolling-Mills, Iron-Works, Shipbuilding Yards, Mines, Collieries, Gas and Water Works, and for general purposes.

For Roofs with Timber Framing, DIXON'S GALVANIZED OR TARRED IRON SLATES form a durable and cheap covering, costing only about the same, when fixed, as felt and boards.

DRAWINGS, ESTIMATES, AND ILLUSTRATED CATALOGUES MAY BE OBTAINED ON APPLICATION.



HODGE & CO.'S

IMPROVED VENTILATING SUN-LIGHTS

WITH TALC REFLECTORS AND SELF-ACTING VALVES TO PREVENT DOWN-DRAUGHT;

VENTILATING GLOBE LIGHTS for DINING-ROOMS, LIBRARIES, &c.

Ormolu, Bronze, & Crystal Gaseliers;

MEDIÆVAL CHURCH WORK AND CORONÆ

COCKS, VALVES, and FITTINGS for GAS, STEAM, and WATER;

COLUMNS, BRACKETS, & STREET LANTERNS;

BLACK AND GALVANIZED BARREL COMPO AND TIN PIPE.

GAS ENGINEERS,

100, HATTON GARDEN, LONDON.

Drawings and Prices upon application.

JOHN WRIGHT AND CO., ESSEX WORKS, BIRMINGHAM,

Beg to call the attention of MANAGERS and DIRECTORS of GAS COMPANIES to the following letter which they have lately received.

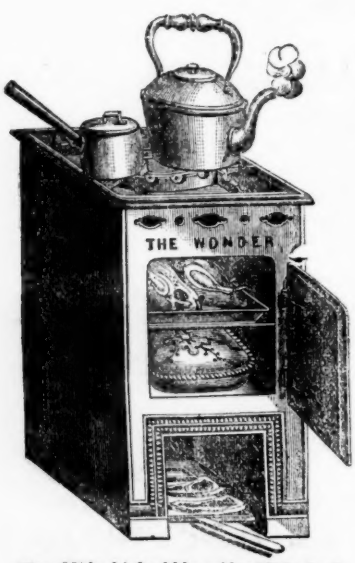
COPY OF LETTER RECEIVED FROM MAGNUS OHREN, Esq.

Crystal Palace District Gas Company, Lower Sydenham, S.E.

To Messrs. John Wright and Co., Essex Works, Birmingham.

Dear Sirs,—In reply to your inquiries, I am glad to state that the use of GAS COOKING AND HEATING STOVES has been a complete success here. We have several hundred in use in our districts. We also find it advantageous to let out Stoves at a small rental. We have now 275 Stoves at rent.

The Stoves you make I can with confidence recommend, having so many in use, and giving satisfaction. I need scarcely point out to you the advantage to Gas Companies to recommend the use of Gas Stoves to their Gas Consumers, even where they do not supply them on sale or rent, as the use of Gas Stoves brings day consumption, and thus the Company make a profit by day as well as by night.—I am, dear sirs, yours faithfully, MAGNUS OHREN.



Size, 25½ in. high; 14 in. wide; 12½ in. back to front.

Price 50s., complete with Pan and Gridiron.

GAS HEATING STOVES

(TERRA COTTA AND IRON).

THE CHEERFUL STOVE.

COOKING STOVES.

BREAKFAST COOKERS.

BATHS HEATED by GAS

GAS STOVES

For Boiling, Broiling, Preserving, Heating Flat Irons, and for all other Domestic Purposes.

Gas Companies and the Trade who have not our Illustrated Catalogue are respectfully requested to apply for same.

A LIBERAL DISCOUNT to the TRADE.

No. 4003.

THE CHEERFUL GAS STOVE, with Copper Reflector,

Has all the appearance of a Bright Fire.

PRICE from 32s.

WARNER AND COWAN'S
SELF-REGULATING GAS-METER,

PATENTED IN

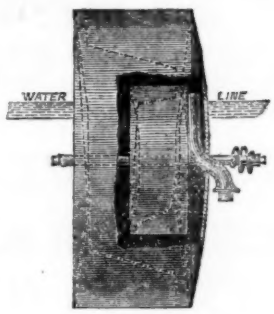
GREAT BRITAIN, FRANCE, AUSTRIA, PRUSSIA, BELGIUM, AND THE UNITED STATES.

OPINION

OF

W. RICHARDS, Esq., London, Inventor of the Dry Gas-Meter.

"Your improvement in the Wet Meter is decidedly the best that has been introduced since its invention; exceedingly beautiful and simple, which renders the instrument mathematically correct, and infinitely more accurate than any means in general usage for the measurement of liquids."



OPINION

OF

WILLIAM MANN, Esq., late Superintendent of the Chartered Gas-Works, Blackfriars, London.

"I saw a model of your Wheel to day,* and certainly think it the best addition that the Wet Meter has received since its invention, to ensure correct registration until the closing of the valve."

* Sept. 8, 1874.

From "THE JOURNAL OF GAS LIGHTING," Jan. 5, 1875.

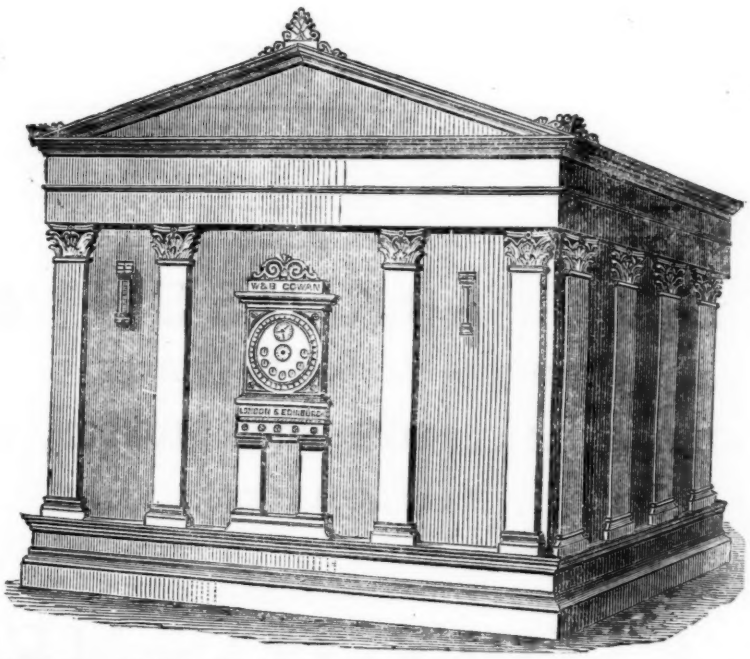
"The changes effected in the construction of the wet meter are such that it now occupies a position which it never held before—that of an unvarying measure. . . . . Both company and consumer are now equally protected, perfect accuracy of measurement is obtained, and that, too, without the least increase of mechanism, or the action of the meter in the least degree being prejudicially affected."

BRITISH ASSOCIATION OF GAS MANAGERS, Leeds, 1875.
Inaugural Address of the President,
JAMES PATERSON, Esq., F.G.S., of Warrington.

"There are, however, degrees of what may properly be termed excellence; and this leads me to notice one of the most beautiful applications which science has yet devised in the construction of the meter, and which has rendered it an absolutely reliable and unvarying instrument. . . . . The object aimed at, and most admirably accomplished, is to change the varying measurement of a varying water-line to an unvarying measure with a varying water-line and annulus."

Original Licensees and Manufacturers: W. & B. COWAN.

EITHER WITH COMMON DRUM OR



WARNER AND COWAN'S SELF-REGULATING DRUM.

W. & B. COWAN'S SQUARE STATION-METER with PLANED JOINTS.

W. & B. COWAN'S large and increasing Export Trade is provided for by their keeping constantly on hand a very large stock of both Wet and Dry Meters, ready for immediate despatch to the British Colonies and Foreign Countries.

W. & B. COWAN,

ESTABLISHED 1827,

KING HENRY'S WALK,
BALLS POND ROAD,
(NEAR DALSTON JUNCTION STATION.) **LONDON, N.**

BUCCLEUCH ST. WORKS,
EDINBURGH.

London 1851. New York, 1853. Paris, 1855. London, 1862.

Dublin, 1865.

The SIX MEDALS AWARDED to THOMAS GLOVER for

PATENT DRY GAS-METERS,

The latter being the Highest Medal awarded for Dry Gas-Meters by the Imperial Commissioners for the Universal Exhibition, Paris, 1867.

Paris, 1867.

THOMAS GLOVER & CO.,

DRY GAS-METER MANUFACTURERS,

214 TO 222, ST. JOHN STREET, CLERKENWELL GREEN,

LONDON, E.C.

THOMAS GLOVER & CO.'S PATENT DRY GAS-METERS,

1st, Are a remedy for all the defects of Wet Meters;
2nd, Are suitable for all climates, whether hot or cold;
3rd, Incur no loss of Gas by evaporation;
4th, Cannot become fixed by frost, however severe;
5th, Are the most accurate and unvarying measurers of Gas;
6th, Prevent jumping or unexpected extinction of the Lights;
7th, May be fixed either above or below the level of the Lights;
8th, Cannot be tampered with, without visibly damaging the outer case;
9th, Will last much longer than Wet Meters;
10th, Will not cost more than one-half for repair that Wet or Water Meters do;
Are upheld for five years without charge.

WILLIAM PARKINSON & CO.,

(SUCCESSORS TO SAMUEL CROSLEY,)

COTTAGE LANE, CITY ROAD, LONDON, E.C.

Established 1816.

MANUFACTURERS OF PATENT

WET & DRY GAS-METERS,

STATION-METERS WITH PLANED JOINTS,

GOVERNORS, PRESSURE REGISTERS, GAUGES,

AND EXPERIMENTAL APPARATUS,

STREET-LAMP METERS,

AND REGULATORS FOR AVERAGE METER INDICATION.

METERS FOR MEASURING WATER.

CONTENTS.

	Page
Circular to Gas Companies:—	
Progress of Amalgamation	645
Possible Opposition	645
An Opinion on Nominee Directors	645
Cost of the Conveyance of Coal to the Imperial Works	645
A Proposal for a Southern Gas Confederation	645
The Town Council of Liverpool and the Gas Company	646
Proposed Purchase of the St. Helen's Gas Company	646
Proposed Purchase of the Exeter Gas Company	646
A Plébiscite at Ramsgate	646
Sale of the Longton Gas-Works to the Corporation	646
The Price of Gas at Aberdeen	646
The Meeting of the South Metropolitan Company	646
Amalgamation of the Independant with the Chartered Company	646
Water and Sanitary Notes:—	
The Metropolitan Board of Works and Water-Rates	646
The Purchase of the Birmingham Water Company	646
Leading Article:—	
A Treatise on the Science and Practice of the Manufacture and Distribution of Coal Gas	647
Communicated Article:—	
The Principle of the Valuation of Gas Coal. By D. A. Graham	648
Correspondence:—	
Coal Contracts of the South Metropolitan Gas Company	649
Mr. Livesey's "Few Items"	649
Trussed and Untrussed Gasholders	649
Gas-Exhausters	649
Station-Meters without Cases	650
Legal Intelligence:—	
Southampton Borough Quarter Sessions—Southampton Gaslight and Coke Company, *Appellants*; *v.* James Ireland, *Respondent*	651
Halifax County Court—Action against the Halifax Corporation to recover Labourer's Wages	651
Miscellaneous News:—	
Suffocation by Gas at Arbroath	648
Richmond Water Supply	648
Metropolis Water Supply	651
Birmingham Water-Works	653
Birmingham Corporation Gas-Works	654
Institution of Civil Engineers	655
Meeting of the Singapore Gas Company	655
On the Supply of Water by Private Companies	656
Iron and Coal Trades of Sheffield, South Yorkshire, and North Derbyshire	659
Iron and Coal Trades of South Staffordshire and East Worcestershire	659
Iron and Coal Trades of Lancashire	659
Coal and General Trade of the North	659
Trade Notes from Scotland	659
Castle Donnington Gas Company	660
Transfer of the Longton Gas-Works to the Corporation	660
Register of New Patents:—	
Ireland, J.—Distilling Carbonaceous Materials	660
Sugg, W. T.—Gas-Burners and Fittings	660
Muller, J. A.—Meters and Motors	661
Foster, E.—Taps and Valves	661
Weston, J. H.—Gas-Burners and Reflectors	661
Morrell, J. C.—Drain-Pipes; Treating Sewage	661
Perrett, E.—Filters	661
Murdoch, H. H.—Screw Taps	661
Verdier, C.—Water Meters	661
Applications for Letters Patent	661
Grants of Provisional Protection	661
Notices to Proceed	661
Inventions Protected for Six Months	661
Patents which have passed the Great Seal	661
Patents which have become void	662

THE JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, NOVEMBER 2, 1875.

Circular to Gas Companies.

The progress towards a voluntary general amalgamation of the metropolitan gas companies is by no means so rapid as could be wished. We have before alluded to possible and probable obstacles in the way of combination, and are sorry to find that some of these exist in full force. In face, however, of existing facts, it is remarkable that so little unanimity prevails among those who have the direction of the companies. There are still some companies who are governed by the Act of 1860, and it is quite natural that they should wish to continue under the same provisions. But the question is forced upon us, Will it be possible to maintain the present *status* of those companies? We are afraid that the question must be answered in the negative. The companies are being pressed upon from two sides. On the one are the Government, urging amalgamation; on the other are the local authorities, pushing forward a measure which is distinctly detrimental to the interests of most of the companies. In this state of affairs, it is certainly astonishing that any hesitation should be shown in adopting a course which obviously offers advantages, and which might be carried out without difficulty.

In the absence of any scheme for general amalgamation, promoted by the companies themselves, the course which the Government will pursue, in the next session, can to us be little more than a matter of speculation. The Board of Trade may bring in a Bill to compel amalgamation, but coupled with conditions which might prove onerous. It is quite possible, too, that, observing the absence of public spirit in some, the Government may abandon all the companies to the tender mercies of the Regulations Bill of last session. Thus all the exertions made, and a positive advantage gained in the past year, will have been thrown away. We must confess that we gave the directors credit for more clear-sightedness, and we begin to regard the future with some apprehension.

It must, we are certain, appear to all who will give the matter a fair consideration, that the present is a peculiarly favourable moment for the success of a general scheme. According to present appearances, and in the absence of disturbing causes, it is more than probable that all the metropolitan companies will be in a position to reduce the price of gas at the beginning of next year. They may thus go before Parliament with the direct testimony that they give the consuming public the advantages to be derived from diminished cost of production, which will be an answer to much that is alleged against them.

No doubt amalgamation will be opposed, at all events, by the Metropolitan Board of Works. It is of no consequence to the Corporation of London; but, as the Metropolitan Board lead the Common Council by the nose, most likely the Corporation will join in the opposition. We have at times said hard things of common council and vestry men, and might have said harder; but, *àpropos* to the appointment of nominee directors by the local authorities, which we mentioned last week, the late Mr. Barlow had recommended, in the event of general amalgamation, we find the following in the columns of a contemporary, who must, if any can, know well the stuff of which common council and vestry men are made:—"Without giving," our contemporary says, "a decided opinion on the proposition, as now made, we "feel bound to say that *our practical experience* of [local] govern- "ment nominees has been that they are *the very reverse of advan- "tageous to the general body of ratepayers*; and, as a rule, the men "who are pitchforked into these positions feel that they are per- "fectly safe from the remarks and criticisms of those they are "supposed to represent, and they are, in most cases, *mere ob- "structions to the general progress of business, and become perfectly "indifferent to their duties.*" This must be true, for our contemporary, who knows them so well, says it; but we never said anything so severe. It is sad to be obliged to believe that a paltry *honorarium* of, say £200 a year, would render a common councilman or a vestryman perfectly indifferent to his public duties. It is only fair to say that the emphasizing italics in the above quotation are our own.

The scheme for the amalgamation of the Chartered and Imperial Companies is not yet, we believe, completely settled; but the propriety of proceeding with all consistent despatch is so clear, that we may feel certain that no unnecessary delay will be interposed. It will, no doubt, be drawn on lines already laid down in previous schemes for amalgamation; but we must wait for the text until it is presented to the Board of Trade. Opposition may possibly be offered on the ground that all new combinations should be postponed until the future circumstances of the companies are decided on. We do not, however, believe that any argument of this kind will prevail with either the Board of Trade or the Privy Council. Any general alterations in the law relating to the metropolitan gas companies will apply to the Chartered and Imperial, whether distinct or united; we, therefore, fully anticipate that a scheme will be sanctioned.

We never knowingly exaggerate, and therefore we hasten to correct a statement made in our last "Circular." The cost of lighterage and canal dues incurred in the conveyance of coals from the Pool to the Haggerston and St. Pancras stations of the Imperial Company is 1s. 4d. per ton. This correction does not in the least affect our argument that, the main difference in the cost of coal to the Ratcliff and South Metropolitan, and to the Chartered and Imperial Companies, is to be ascribed to charges for conveyance to works, and not to *extravagant contracts*.

Among the rumours afloat respecting amalgamation, is one that, an attempt will be made to effect the compulsory union of the companies south of the Thames, by a Bill, the chief feature of which, beyond amalgamating powers, will be the sliding scale applied to dividends. We have a great objection to the sliding scale, and do not regard partial amalgamation with favour. If, however, a southern confederation can be formed (which, *per se*, we regard as impossible) we should not object, as it would inevitably lead to that levelling up of price which we predicted more than a year ago would, in time, take place. This eventuality is clearly foreseen by some, and an outcry is certain to be made against such a combination as, we are told, has been projected. The projectors would do infinitely better if they joined in a general scheme, which would place all the metropolitan consumers and companies on an equal footing.

We shall not be able to report the proceedings at the meeting of the South Metropolitan Company, which takes place as we go to press; but in a postscript to our "Circular" we may be able to give the broad result. From information which has already reached us, we have but little doubt that the minority on the

direction will carry their point, and that a resolution will be passed pledging the company to go to Parliament next session for an Act embracing the provisions of the Regulations Bill. Of what else may be proposed we have at present no certain knowledge. We have said before that every company have a right to manage their own affairs as they think fit; but we have a strong objection to any one aiding in imposing conditions, easy to themselves, on others to whom such conditions would be disastrous. It is, we venture to assert, from no fault, no vice, that some companies are to-day worse off than others. Of course, it is easy to describe the Chartered Company as a "rotten concern;" but we think it would have shown better taste if the company who have taught the art of gas lighting to the whole world had been spoken of in more respectful terms.

At the last meeting of the Town Council of Liverpool for the expiring municipal year, held on the 27th ult., Dr. Cross, the chairman of the Gas Committee, brought up a report of their proceedings, and asked for the reappointment of the committee. The substance of the report we gave last week. The committee have been investigating, and have not yet completed their investigations. So far as they have gone, however, they have incurred an expense of upwards of £100, and the Finance Committee of the Corporation refuse to pass their bills. Hence Dr. Cross is, for the present, out of pocket to the extent we have just mentioned. It will be made up to him, no doubt, in the long run, but to-day the Town Council, or rather the Finance Committee, seem ungrateful. For the information of Manchester consumers, we quote a statement made by Dr. Cross, relying on the reporters for accuracy, inasmuch as we cannot, at the moment, check the figures. It was as follows:—"That the profit derived by the "Liverpool Gas Company for the present year was £69,000, "whilst the profit derived by the Manchester Corporation from "their gas-works—with an income of £57,000 less, and with a "charge of 7d. per 1000 less—was actually £37,000 in excess of "that of Liverpool." If the above is correct, are we not right in saying that gas is much too dear in Manchester?

The St. Helen's Town Council are in treaty with the gas company for the purchase of their undertaking. At present the two parties cannot agree as to the terms; but a deputation from the council will meet one from the gas company at an early day after the elections, and in all probability satisfactory terms will be arranged.

The Town Council of Exeter have got so far on their way to the purchase of the gas undertaking, that they have actually instructed the town-clerk to write and ask the company upon what basis they propose to treat for the sale of their works. The company, at any rate, are in safe possession of their property for another year.

The Local Board of Ramsgate have invited their constituents to go to the town-hall between the hours of 10 a.m. and 4 p.m., and sign a memorial to the effect that they consider it desirable that the gas-works and water-works should be under the management of the Local Board. The Board cannot imagine that this "kind of a sort of" *plébiscite* is equivalent to a town's meeting under the Borough Funds Act. The probability is that very few ratepayers and gas consumers will take the trouble to walk to the town-hall for the purpose of attaching their signatures to the memorial. If we are correctly informed, there is really no dissatisfaction with either the gas or the water company. Great efforts are being made to induce the inhabitants of Ramsgate and St. Lawrence to sign the memorial, and we shall presently learn the result. Whatever that may be, we may say again that the gas company are safe in the possession of their property for another year.

The Town Council of Longton have made the first application to the Local Government Board, under the Public Health Act, for their sanction to a loan for the purchase of a gas undertaking. We mentioned some months ago that the Town Council and the company had settled the terms, which turn out to be highly favourable to the Corporation. Fifteen and three-quarter years purchase is, we rather think, the lowest price ever accepted for a statutory undertaking paying full dividends. The works are in excellent order, and the Corporation have obtained a great bargain. The loan applied for, and which will, no doubt, be sanctioned, amounts to £75,000.

The Town Council of Aberdeen, having made the estimate of the revenue and expenditure for the next year, in connexion with the gas undertaking, have resolved to reduce the price of gas from 5s. per 1000 feet to 4s. 10d. In the year ending Sept. 30 last, the deficiency of profit to meet necessary expenditure was £1291. For the coming year, of course, favourable contracts for coal have been entered into, and the Town Council expect to make up the deficiency, and next September have a surplus of £527. Their estimate of revenue for the year is £45,466, and of expenditure, £44,939. We commend the Aberdeen method of managing a Corporation gas undertaking to the attentive notice of consumers under Corporations in the south.

At the meeting of the South Metropolitan shareholders, which took place yesterday afternoon, resolutions were carried, pledging the company to petition in favour of the Regulations Bill, if introduced next session, and recommending that, in the event of the rejection of that measure, the company should, in the following year, promote a Bill of their own, adopting the sliding scale. Since, if such a Bill were promoted, it would be advisable to ask for additional capital, not immediately required, it was resolved to introduce a clause to enable the directors to raise portions, as it might be wanted, under a certificate from the Board of Trade, and another clause to give the company amalgamating powers. It is fair to add, that great unanimity was exhibited at the meeting.

We are enabled to announce that the Independent Company have now joined with the Chartered and Imperial, necessarily and naturally with guaranteed dividends. We may presume that these recent amalgamations will be embraced in one scheme, which, we understand, is likely to be settled by an early date.

Water and Sanitary Notes.

THE Metropolitan Board of Works have had their discussion on the water question, and the outcome has been a resolution pledging the Board to go to Parliament, next year, with a Bill to alter the terms on which water is supplied in the metropolis, and to provide that the consumer may claim to be supplied by meter. The principal objection made is to the levying of the water-rate on "annual value," and not assessing it on "net," instead of "gross" value. But the difference, as Mr. Richardson says, is not very great, and it is worth nobody's while to go to law to ascertain what are the exact rights of the water companies in this respect. It may be remarked, however, that Corporations and Local Boards universally charge on "gross annual value."

We think the London authorities are rather short-sighted. They are hoping, some day, to get possession of the water supply of the metropolis, and they are forging a chain for the companies which may some day get round their own necks. As a matter of principle, there can be no doubt that a supply by meter would be the correct thing. But the adoption of the meter system might lead to very important consequences, sanitary and other. At present, the inhabitants get their daily supply of 25 gallons per head. We know that a great part is wasted; but sanitary authorities tell us that the quantity supplied is not sufficient. Now, the meter system would unquestionably induce economy. Careful householders would watch the consumption of water as they do that of gas, and the result, we have little doubt, would be the reduction of the consumption of water to about one-third of the present quantity. What, then, must the price of water be, and what will be the effect of the reduced consumption on the sewers? There is something here that deserves more consideration than it has yet received.

As to other bases of assessment suggested, we have thought them all over long ago, and regard them as altogether impracticable. If it were proposed to rate houses for water according to the number of rooms they contain, it would certainly be urged that the consumption of water bears only a faint relation to the number of rooms. If, too, a sort of poll-tax for water were instituted, gross inequalities of taxation must result. Some houses are fully occupied all the year round, but Lord Camperdown would certainly complain that his town mansion (if he have one) is practically untenanted for more than half the year. Then, again, two people with a mania for "tubbing" in one house, may consume as much water as twenty in another.

It is argued that City property deserves special exemption because it is not residential. Now, we may admit that a certain class of warehouses may fairly claim a special assessment; but in a house full of offices, in which some forty or fifty, or more, clerks are employed, a great deal of water is used. They all visit the closet, and the City clerk is fond of washing his hands. It is almost the only relief he has from the bewilderments of book-keeping. On the whole, we doubt whether there is much to be complained of in the City; and we are inclined to think that the authorities will find some difficulty in persuading Parliament to change the mode of assessing water rates.

The "biggest thing" in the way of a purchase of a water undertaking has just been completed by the Birmingham Corporation, and very sensibly without going to arbitration. We need not go into many figures here, since they will be found in some detail in another column. It is sufficient to say now, that the purchase, as just settled, involves the payment by the Corporation to the shareholders of the company of perpetual annuities to the amount of £54,491. The profit anticipated from the under-

taking in the next year is £53,000. Thus there may be a loss of £1500 in the first year. The nominal rate of increase under the company has been £3000 a year, so that the second year there will be a surplus of £1500, constantly increasing in a like ratio. But further large additions to the surplus are possible. The water company assessed the smaller houses at their full value, but never exacted the maximum rate from the better class. If the rates were equalized, it would now add £7000. But they have still another opportunity. There are from 70,000 to 100,000 inhabitants of Birmingham who take their supply from private shallow wells. If the Corporation were to close these, as they might, and are certain to do eventually, about £20,000 a year would be added to the water profits. We are glad to see that the Corporation do not propose to take the latter step immediately. Their programme is to lower the rates on the poorer classes, and so induce the people to resort to the purer supply. It is admitted on all hands that the condition of the works to be handed over is perfect. The success to the Corporation is assured under any circumstances; but we are certain that the undertaking will be well managed in the proper sense. We are especially gratified with the assurance of the mayor that no intention exists of making profits to supplement an improvement-rate.

A TREATISE ON THE SCIENCE AND PRACTICE OF THE MANUFACTURE AND DISTRIBUTION OF COAL GAS.

LXXI.

Gasholders.

The following list of prices of single holders of various dimensions may be regarded as tolerably correct, but it is not to be supposed that they will always correspond with those furnished by different makers. In the early volumes of this Journal, a list of tenders by different firms, for certain works, was given from time to time, in which the great disparity, or "wide estimating," existing between them was often a matter of astonishment. The same observation applies to many other kinds of business, examples of which must come under the notice of our readers daily.

A gasholder of 40 feet in diameter and 15 feet deep at the sides, of a capacity of about 18,000 cubic feet, constructed of sheets of the thickness, and trussing of the strength indicated in the specification of gasholder 35 feet in diameter, having six cast-iron columns with girders, and counterbalanced at three points, as represented in engraving, together with three tons of counterbalance-weights, inlet and outlet pipes, syphons, and holding-down bolts complete, will cost, delivered at railway station, or free on board ship, according to the position of manufacturer's premises, about £360.

The price of a similar holder, of 50 feet in diameter and 15 feet deep, of a capacity of about 28,000 feet, will be approximatively £480. And another of 60 feet diameter and 16 feet deep, of a capacity of 44,000 feet, will cost about £630. Both these holders, like the preceding, are counterbalanced, and are complete in all their details ready for erection.

Holders of 70 feet in diameter and upwards are usually made without counterbalance-weights, the large area of the tops of these vessels, as compared with their weight, causing a diminution of the pressure given by them. A holder of this diameter, and 16 feet deep, will weigh about 23 tons, and its pressure will be about 2½ inches, which amount will, in many cases, be required for the purpose of giving a proper supply. Of course, in towns of the first magnitude, where the gas has to be sent sometimes a distance of six or eight miles to the extreme point of consumption, this pressure will be materially exceeded. When referring to low pressure, it is intended for works and districts of limited capacity.

The cost of a holder like that in question, with eight cast-iron columns and girders, and pipes of communication, &c., will be about £880; and another 80 feet in diameter, and 20 feet deep, with ten columns and girders, may be estimated at £1300.

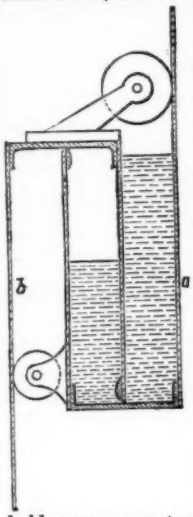
Some of the prices mentioned are those actually paid, the others have been furnished from time to time, and it may be stated that they do not include any extraordinary expenditure, either in the strength of trussing, girders, or columns; but the most essential parts, the sheets, being of the best quality, and of suitable thickness, the thinnest employed in holders above 50 feet in diameter being No. 14 gauge.

Where economy of construction is desirable, all holders of 70 feet in diameter and upwards may be constructed without trussing to the roof. Of these, some examples will be given; and it may be stated that the greater the diameter the greater will be the economy derived from the use of untrussed roofs. When trussing is employed, it should always be supported at the centre of the roof by placing a pier directly under the king post, on which the centre reposes, when the holder is down.

Telescopic Gasholder.

In the ordinary and general course of events, necessity gives rise to invention. This, however, was not the case with the telescopic gasholder, which, as we have learned, since treating on this subject on a former occasion, was invented, although comparatively unknown, several years before it was required or brought into practical operation; but once applied with success, it was speedily adopted by some of the metropolitan as well as provincial companies, where the limited site of the premises rendered it imperative to employ every means of obtaining space for the storeage of the gas.

The telescopic holder is comprised of a single holder of the ordinary construction, surrounded at its base by an annular cup of from 12 inches to 24 inches deep, and from 8 inches to 12 inches wide. This holder is enclosed by a second holder formed by a cylinder constructed of similar material to, but somewhat larger in diameter, and of the same height, as the sides of the inner holder. To the top of this outer cylinder is attached an annular "grip," corresponding with the cup, as shown in section in the accompanying sketch; *a* is the cup attached to the bottom of the inner holder, which, each time in rising, is filled with water; *b* is the "grip" attached to the top of the outer cylinder or holder; part of the grip being immersed in the water forms the luting or hydraulic joint. Thus on the inner holder becoming filled with gas, the water in the cup forms a seal, and the outer holder is then raised, resembling the tubes of the telescope, whence its name. The rollers are for the purpose of preventing any unnecessary play, which would be fatal to the action of the apparatus.



Although there are chains and counterbalance-weights, intended to counteract the weight of the water in the cup of the inner holder, yet in practice, whenever the outer holder commences to rise above the water, the pressure is augmented. At least, that has been our experience, and it has often caused some surprise that engineers or the constructors of these apparatus do not provide a sufficiency of counterbalance-weights to reduce this pressure to the minimum, for, with our present knowledge, this may be estimated to the most narrow limits.

In the old-fashioned single-lift holders, when badly constructed, by having an excess of play or otherwise, if they were out of level, even to such an extent as to be disagreeable to the eye, no ill effects were experienced—at least, so long as the holder remained sealed—but the telescopic holder requires the most rigid care in its design, construction, and erection.

This can be readily understood, when it is explained that they frequently exceed 200 feet in diameter (one at the Fulham station of the Imperial Company being 233 feet), that their cups do not sometimes exceed 18 inches in depth, one half the water of which may be displaced by the pressure. Under these conditions, therefore, the utmost care is indispensable in erection, in order to maintain the vessel perfectly level at all the varied elevations, to prevent the water escaping from the luting, and yet to avoid any binding that would add to the pressure, and might cause the holder to blow. For such constructions, the rule of thumb operations of the past are quite unsuitable. The drawings and specifications of gasholders, therefore, that we are enabled to present from time to time, as carried into execution by our most eminent engineers in establishments of the largest magnitude, cannot be regarded otherwise than instructive.

Formerly, when the site of some of our metropolitan gas-works was exceeded in extent by the manufacturing premises of many private firms, the main object in employing telescopic gasholders was to extend the operations of the works within their limited sphere. But at the present day, when the full importance of gas-works is well understood, and sites for their erection are chosen which are practically ample for all time, the question of space is no longer an inducement for the construction of such holders, the great consideration being economy; and when we consider the immense sums required to be expended in this description of apparatus, any saving in their cost must be desirable.

To demonstrate the advantages of telescopic holders in an economical point of view, let us take the average cost of a stone or brick tank to be £15, and that of a single holder to be a like sum, which by a singular coincidence is the case, making together £30, per 1000 feet capacity. To render the dimensions of the tank suitable for a telescopic holder, a slight increase of expenditure only would be necessary; the cost may, therefore, be estimated at £16. Let us also suppose the outer lift to cost £15, then, as the holder is doubled in capacity, an economy of about 35 per cent. is effected by the adoption of the telescopic principle.

There are, however, certain localities where the limits of the gas-works have been so restricted as to compel the engineer to resort to three-lift telescopic holders. These are constructed in a similar manner to those already described; but having two concentric cylinders with their corresponding cups and grips, with chains and counterbalance-weights; the holder, when full, rising to three times the height of the single holder. An excellent specimen of this class of structure still exists at the Blackfriars works of the late City of London Company, of which an engraving will hereafter be presented.

The three-lift holder, however, is not to be recommended as economical in erection, in consequence of the extensive framing and columns necessary to prevent the wind from tilting the holder when at its highest elevation; but as a specimen of engineering work, it is worthy of admiration.

An argument raised against telescopic gasholders, is the liability of the water, forming the lute, or seal, to freeze, in which case the action of the holder would be impeded. We believe, however, this to be an objection raised on theoretical grounds, and not founded on

practice, as we have never yet heard of such an occurrence in England. Moreover, from the very general adoption, in all modern works, of this kind of holder, we should be led to suppose that there are no real grounds for these objections.

(To be continued.)

Communicated Article.

THE PRINCIPLE OF THE VALUATION OF GAS COAL.

By D. A. GRAHAM.

Rules for the Valuation of Coal and Cannel Cokes.

Were gas coke all composed of fixed carbon, there would be little difficulty in arriving at the accurate relative commercial value of cokes produced from different coals and cannels; but a large number of cannels, and almost all shales, contain so very large a per centage of ash as to render the cokes they produce utterly worthless, and—unless some principle could be introduced to make allowance for this loss—a result might be arrived at from theoretic reasonings which would be utterly fallacious.

One chemist uses a constant (0·1374) which, multiplied by the number of pounds of fixed carbon contained in the coke a ton of coal or cannel produces, will give a number which will represent the pounds of water that particular coke is capable of evaporating.

Such a rule might be approximately true, and made applicable for cokes containing a very small per centage of ash; but the presence of a very large quantity of foreign matter would unquestionably *very* materially affect the result.

Mr. Whimster, the very able engineer of the Perth Gas-Works, informs us that he finds that when a coke contains 20 per cent. of ash it is quite useless and unsaleable, and has to be carted away as rubbish.

The particles of carbon are so surrounded and encased with other matter as to prevent the proper combustion of the carbon it contains; hence, except under exceptional circumstances, such a multiple would be useless for practical purposes.

Mr. Whimster's experience, obtained in a locality where coke fetches a large price, on account of the comparative scarceness of coal, may, however, furnish us with data from which a rule could be constructed, which would very nearly express the different commercial values of various qualities of coke.

It is always easy to obtain the amount of coke a coal or cannel will produce, and the per centages of ash it (coke) contains, and if 20 per cent. of ash renders a coke worthless and unsaleable, a series of numbers could easily be found to express those gradations of quality between 0 and 20 per cent., which could be used so as to obtain the value required.

Every analysis of coal or cannel should supply information respecting the weight of hot coke that coal or cannel will produce; and the per centage of ash this coke contains, this per centage being expressed as a fraction of the weight of the coke, which weight would represent unity. It would then be easy to apply the following empirical rule, in which, by multiplying the known average commercial value of a particular coal by its weight per ton, and a number corresponding to the per centage of ash the coke contained—a value could be found not greatly differing from its possible natural average commercial value.

The following table provides such a series of multipliers, ranging from the limits 0 to 20 per cent., which, together with the information as to the amount of coke and ash a coal or cannel produced, would enable these relative commercial values to be approximately ascertained.

Table of Multipliers for the Reduction or Increase of Values corresponding to the per centages of Ash contained in Coal or Cannel Cokes, varying from 0 to 20 per cent. of the weight of Coke per ton a Coal or Cannel Produces.

Per Centages of Ash.	Multipliers.	Per Centages of Ash.	Multipliers.
0	0·0	11	0·55
1	0·05	12	0·6
2	0·1	13	0·65
3	0·15	14	0·7
4	0·2	15	0·75
5	0·25	16	0·8
6	0·3	17	0·85
7	0·35	18	0·9
8	0·4	19	0·95
9	0·45	20	1·0
10	0·5		

Rule.

Now as to the method of applying these numbers.

First find the average annual commercial value of the whole coke a gas-work produces, or this same average value per 100 lbs. sold. Also find the average production of coke per ton of coal and cannel, or the coal or the cannel used, and the per centage of ash this average quality produces (where the qualities of both the cokes which are being compared is good, it would be unnecessary to take per centage of ash into account—in such a case it might conveniently be neglected); and find these same values for the coal or cannel coke with which this standard quality and value are to be compared.

Then, 1st, their respective values will be directly as their weights; and, 2nd, this value, multiplied by the number corresponding to the per centage of ash the coke contained, whose commercial value it was desired to find, would produce a value which, deducted or added to the standard value, would represent the value required.

An example will best illustrate this rule.

Example.

The average annual price coke fetched in a certain gas-works was equal to 6d. per 100 lbs. sold, and the ton of coal produced 1520 lbs., 4 per cent. of which weight was ash. Another cannel produced 1221 lbs. of hot coke per ton carbonized, and that coke contained 9 per cent. of ash. What was its relative value?

$$12{\cdot}21 \times 6\text{d.} = 73{\cdot}26\text{d.}$$

The number corresponding to 9 per cent. of ash is 0·45, and

$$73{\cdot}26\text{d.} \times 0{\cdot}45 = 32{\cdot}977$$

Their difference is . . . . $40{\cdot}283 = 3\text{s. } 4\tfrac{1}{4}\text{d.}$

which would represent the comparative value of the 1221 lbs. of coke produced from this cannel; so that, while the ton of coal coke was selling for 11s. 2½d., the ton of this cannel coke would sell for 6s. 2d.

Another Table for the Valuation of Gas Coke.

We find that different authorities express very various opinions as to the per centage of ash a coke must contain to render it commercially worthless.

Thus, while Mr. Whimster, of Perth, states that in his district 20 per cent. of ash in a coke will render it commercially valueless, Mr. Hislop, of Paisley, on the other hand, places this limit as high as 50 per cent. of ash and 50 per cent. of carbon; these being the highest per centages at which he finds people will remove coke from his works for nothing.

It will, therefore, be evident that each district will have a limit of its own, necessitating the use of other tables to obtain the values required.

We, therefore, append another, where the limit is taken at 40 per cent. of ash, which is a value intermediate to Mr. Whimster's on the one hand, and Mr. Hislop's on the other.

It will be apparent that the multiples in these tables are those corresponding to the ordinates of a triangle, but were experiments to be made to determine the amount of water the best and worst cokes which could be sold would evaporate, these quantities being determined for two extreme, and three or more intermediate values, the limit for inferior qualities being represented by that per centage of ash which just rendered a coke commercially worthless for a particular locality; that is, that per centage which would just repay the labour of the consumer for removing it from a gas-work for nothing.

Experiment might show that these numbers should not decrease proportionally with the quantity of carbon a coke contained, but that they should correspond to the ordinates of some curve, such as the parabola or hyperbola, which would probably more nearly express the exact commercial relation of these values to each other.

Mr. Whimster's limit also takes another factor into account, the extra labour, expense, and trouble entailed in the working of an inferior article, which must certainly be no contemptible item for inferior qualities of coke.

The following table expresses the triangular ratios for a limit of 40 per cent. of ash.

Per Centages of Ash.	Multipliers.	Per Centages of Ash.	Multipliers.
0	0·0	21	0·525
1	0·025	22	0·55
2	0·05	23	0·575
3	0·075	24	0·6
4	0·1	25	0·625
5	0·125	26	0·65
6	0·15	27	0·675
7	0·175	28	0·7
8	0·2	29	0·725
9	0·225	30	0·75
10	0·25	31	0·775
11	0·275	32	0·8
12	0·3	33	0·825
13	0·325	34	0·85
14	0·35	35	0·875
15	0·375	36	0·9
16	0·4	37	0·925
17	0·425	38	0·95
18	0·45	39	0·975
19	0·475	40	1·0
20	0·5		

But, whatever experience and experiment may finally show what these numbers ought to be, we believe that the method we have here recommended will be found to be easy of application, and the best suited where time is an important consideration.

SUFFOCATION BY GAS AT ARBROATH.—On Friday last an escape of gas took place during the night in the house of a tinsmith, named M'Leish. As the house remained closed all the day, a forcible entrance was effected, when two children were found dead in bed from suffocation. The man M'Leish was also in an insensible condition, from which he never recovered, but died on Saturday afternoon.

RICHMOND WATER SUPPLY.—At a special meeting of the Richmond Select Vestry, on Wednesday, Oct. 27, a letter was read from the Local Government Board sanctioning the borrowing of £28,000, for the purpose of obtaining a local water supply. It was proposed by Mr. T. F. Giles, and seconded by Dr. Kenny, that application be immediately made to the Public Works Loan Commissioners for the required sum at 3½ per cent., repayable in 30 years. Mr. C. Burt opposed, remarking that he had not found the water supplied by the Southwark and Vauxhall Company so bad as had been represented, and that he saw no necessity for the proposed change. Mr. Giles said he heard frequent complaints respecting the quality of the water, the insufficient supply, and the increased rates; and this statement was confirmed by Mr. Gascoyne, Mr. Maxwell, and other vestrymen. On a division, the motion was carried almost unanimously, Mr. Burt being the only member voting against it. It was further resolved to request Messrs. Russ and Minns, engineers, to attend a special meeting of the vestry, with plans and specifications, &c. It is intended to sink a deep well into the chalk, and to have a large covered reservoir in Richmond Park. The Crown authorities have already sanctioned the construction of the reservior; and Mr. Hawksley, C.E., Mr. Prestwich, the geologist, and other scientific gentlemen, have given it as their opinion that an abundant supply of water will be obtained from the chalk basin underlying Richmond.

Correspondence.

COAL CONTRACTS OF THE SOUTH METROPOLITAN GAS COMPANY.

SIR,—At the meeting of the shareholders of the Phœnix Gas Company, as reported in your JOURNAL of the 12th inst., we observe that the chairman of that company, referring to a question which Mr. Livesey had raised, used the following words:—"But I may say generally that we have to take contracts for our coals, and not buy them, as the South Metropolitan Gas Company do, from hand to mouth, and take the chance in winter of being frozen out and getting no coals at all. By good luck they have succeeded, and by buying coal in that way they have been able to get it at a lower rate."

Now, as the agents for the South Metropolitan Gas Company here, for the purchase of their coals, a trust with which we have been honoured for upwards of 30 years, we beg to give a most emphatic denial to the assertions of the chairman of the Phœnix Gas Company, and to say that until 1873 we made a yearly contract for the South Metropolitan Gas Company, that in that year we made, by Mr. Livesey's directions, a contract for only 20,000 tons in the spring, believing that the price would fall, that when that contract was completed we made another at 2s. per ton less, and then another at 2s. further reduction, and a fourth at a still lower price, showing the prudence of the directors and manager in not making a contract for their whole supply when gas coal was at its highest figure. Now, as regards the assertion of the chairman of the Phœnix Company, that the South Metropolitan Gas Company bought from hand to mouth, and took their chance of being frozen out, &c., that assertion is utterly without foundation, and must have been thoughtlessly made. We know exactly what the consumption of the company is, and we beg to state, without the slightest fear of contradiction, that the South Metropolitan Gas Company have always a large stock in case of emergency or a frost, and have often been applied to for assistance by other companies. Last winter several London companies were reduced to three or four days stock (and, speaking under correction, we believe that the Phœnix Gas Company was one), while the lowest stock our company was ever reduced to, was, *on one occasion only*, to between two or three weeks. We deem it due, for the honour of the directors and manager of the South Metropolitan Gas Company, to make the foregoing statement, otherwise the shareholders might imagine that their affairs were managed with what, if the assertions of the chairman of the Phœnix Company be correct, would be the grossest imprudence.

ADOLPHUS P. HARRISON AND CO.

Newcastle-upon-Tyne, Oct. 26, 1875.

MR. LIVESEY'S "FEW ITEMS."

SIR,—I should be glad if you would permit me to lay before your readers another word or two on my "few items," on which you commented last week. I did not point out that the Ratcliff and South Metropolitan enjoyed exceptional advantages in getting coal to their works—in the case of the Ratcliff because they are one amongst six or seven gas-works situated on the river, and, like the rest, have to pay lighterage. Beckton only escapes this charge. As to the South Metropolitan, had I said anything it would have been to point out its *dis*advantages, in common with other works situated on canals without railway facilities.

In the first place, steamers discharging at the derrick (where, practically, they all do discharge for river-side works) may be chartered at 6d. *per ton lower freights* than those discharging in canals; then there are canal dues to pay of 6d. per ton in the case of the South Metropolitan, besides the cost of lighterage up 2½ miles of dock and canal, amounting to a further charge of 8d. per ton when barges are hired for the purpose, but reduced to 4d. by the use of the company's own barges. This saving of 4d. on the lighterage is only so far exceptional, because other companies have not thought it worth while to have their own barges.

The chairman of the Phœnix Company stated at their last meeting that, before the coal panic, they used to get their coals cheaper than the South Metropolitan, which can be accounted for by their exceptional advantages through having river-side works. These conditions have not changed during the past three or four years; but the present difference is really owing to more favourable purchases in the North; for I can state, as a fact within my own knowledge, that there are contracts made this year by the companies named in my list, ranging from 7s. 10d. net to 11s. 6d. net for coals, f.o.b. in the Tyne, and these contracts will run to the end of the year, while in the first half of the year there were differences quite as great, if not greater.

You make a guess at my object in extracting and sending for publication the "few items." I have no wish to conceal my motive, which was the thought that the facts so made known might help forward the "sliding-scale" movement, by showing how a considerable portion of the difference in the price charged for gas by the different companies might be accounted for; and I maintain that, with an adequate motive—and the only really efficient one, in my opinion, is that of direct pecuniary interest, as in commercial undertakings it is the right one—all the London companies ought to purchase coals at about the same rates, the larger companies having a slight advantage.

At present the gas companies are like boys in a class—one is at the head and tries to keep there; one or two others think they have a chance of taking his place, and accordingly try for it. With the rest there is no immediate probability of occupying a good place; consequently, if my simile holds good, they have very little heart to try.

Now the sliding scale would alter all this. Each and every one would have a strong motive to do the best possible, and I am very much mistaken if it would not be found to be greatly to the benefit of all parties concerned—consumers and companies—though I do not deny that to some of the latter it would be more beneficial than to others.

I have advocated the principle because I have the strongest conviction that it is *just*, and I will continue to advocate it until I am convinced to the contrary.

GEORGE LIVESEY.

South Metropolitan Gas Company, Old Kent Road, S.E., Nov. 1, 1875.

TRUSSED AND UNTRUSSED GASHOLDERS.

SIR,—Mr. Livesey, in last week's JOURNAL, states that, by not trussing his gasholder of 180 feet diameter, he made "a reduction of about 100 tons in the weight of the gasholder, effecting a reduction of two inches of pressure." Some of the largest gasholders in operation show just the reverse of this. I have before me two examples of sinking gasholders, of similar diameters to the above, one of them *not* trussed, but weighing 106 tons in *excess* of the other, which is trussed, and self-supporting. The weight of wrought iron used in trussing the dome or roof is 70 tons; and this, if economically arranged, could be reduced to 50 or 60 tons. Whence, therefore, comes the saving of 100 tons by not trussing the crown of the gasholder? Against the weight of trussing in self-contained holders, there has to be placed the extra strength of curb, and the plates adjacent to same, which occur in all untrussed, or bladder-topped, holders. I may remark that gasholders properly framed, of large capacity, holding, say two millions of cubic feet of gas, with a sinking margin for safety of four to one, can certainly be erected with a reduction in the floating weight of more than 100 tons, as compared with the other form of holder. The self-contained holder sinks steadily, presses lightly upon and requires the smallest number of supports to the external framing, retains its shape truly under all conditions, and is independent of all those wooden props and temporary crutches which support the flabby weakness of the crown to the untrussed holder.

Oct. 30, 1875. V. WYATT.

GAS-EXHAUSTERS.

SIR,—As Mr. Cleland is unable to answer the four questions I put to him touching steam-jet exhausters, namely—1. The quantity of gas passed per hour; 2. The pressure resisted; 3. The quantity of water evaporated; and, 4. The pressure of the steam—there is no use in pursuing the matter further, but await facts when they can be furnished; meantime I must remain, not in scepticism, for that implies doubt, but in a state of utter disbelief.

Mr. Cleland does not properly appreciate my discontent with his German statistics of (only) 5 lbs. of water for the steam that sufficed to produce the proper amount of exhaustion.

I am not in love with an article merely because it is "home made," but I prefer it because—and only because—investigation is more easy.

I have lived long enough to know that we "must not believe all we hear."

Some misstatements are made through interested motives, some are made through mere enthusiasm, and some are made through a misinterpretation of nature; but whatever may be made, when they contradict our reason we ought to judge for ourselves.

This opportunity I thought Mr. Cleland could give me, for I thought his paper was an account of things done by himself, instead of which it now appears that the things were done in Germany, and only recorded in Mr. Cleland's note-book.

However, I can afford to wait till some English authority favours us with answers—the result of experience.

I have heard of wonderful things coming from abroad before. I remember one fellow whose inventions in the manufacture of gas were so wonderful, that every ton of material employed was alleged to produce a ton and a quarter of gas and other products—he did not say so in so many words, but his representations worked out that—and we have had many such representations made to us since, else why are we still making gas from coal, when so many superior modes have been proposed to us—modes, too, which have been tried—all the money lost, except to the speculators, who sold their inventions "to flats"?

"Some people have brains and no money, some have money and no brains." The latter, wrote "Sir Roger," were made for the use of the former. It may be; but in my affairs I elect to use my brains before my money—a practice in which I have the most unwavering faith.

There are other points in Mr. Cleland's able paper which, if I have time, I should like to pass under observation, if you will allow me, in your next issue.

4, *Cannon Row, S.W.* GEORGE ANDERSON.

SIR,—In the JOURNAL for Oct. 19 (No. 649) is a letter by Mr. R. H. Patterson, respecting the term "exhausters," in which he suggests that, instead of this name, which expresses imperfectly that which is its signification, the name "propeller" should be adopted.

Please to allow some remarks, as a reader and subscriber of your esteemed paper, for, although a stranger to you, I am allied with you upon the field of knowledge, and in your endeavours to obtain perfection of our apparatus in general.

The expression "exhauster" has been made use of, for aught I know, from the first by English engineers, and it marks entirely and correctly that which it intended. The word "exhauster" originates from the Latin, in which the verb "*exhalare*" signifies so much as "to breathe out," "to exhale;" in French, "*exhaler;*" in German, "*aushauchen,*" &c., &c.

The so-called "exhauster," in our modern signification, particularly in gas manufactories, receives the producing gas coming out of the retorts, and drives it, or "breathes it out," to the gasometers. The expression "propeller" (in French, "*propulseur;*" in German, "*treiber*") would consequently signify nothing else than a perpetual motion of the gas from the retorts to the gasometers; therefore, it could hardly be adopted in the whole field of gas manufactures as more correct than "exhauster."

As for the rest, I join completely the views of Mr. R. H. Patterson respecting the importance of the exhausters. Although each apparatus may be the subject of improvements, it is, after all, the exhauster which has become, with the introduction of the "steam-jet gas-exhauster" by Körting, one of the most complete apparatus in gas-making.

That the importance of the exhauster is acknowledged, at least by the German engineers, is confirmed by the fact that in Germany exhausters are being adopted almost without exception, even in the smallest manufactories of two to three million feet production yearly, knowing very well, as they do, what a favourable influence they exercise in conservation of the retorts, in the production of gas per ton of coal, and even in the coal consumption per retort. The gas production, per ton of coal, cannot be less than 5 to 7 per cent. higher by application of an exhauster.

At the same time, permit me a remark also upon the "simple inquiry" of "A Young Gas Manager," as to the best means of depriving gas of its ammonia. This apparently "simple inquiry" is one of the most difficult touching, even now-a-days, the whole gas industry, and cannot be replied to without great difficulty.

The depriving gas of its ammonia having been studied by English engineers for several years with zeal, and is now caused to be made a matter of a competition by the "Verein der Gasfachmänner Deutsch-

lands," through the zealous action of the renowned chief director of the "Deutschen Continental Gas-Gesellschaft in Dessau," Mr. W. Oechelhäuser, in the assembly held on the 3rd, 4th, and 5th of June this year, whereby certainly the simple inquiry of "A Young Gas Manager" will be answered in full and completely.

CONRAD VOSS, Engineer.

Gas-Works, Cracow, Galicia, Oct. 25, 1875.

SIR,—As the observations of your correspondent, Mr. Patterson, respecting the deposit of carbon in the retorts, if allowed to pass unnoticed, might mislead many of the younger members of the profession, I venture to offer a few remarks on the subject. Mr. Patterson must of necessity be aware that when coal is submitted to the action of the lowest degree of heat necessary for its destructive distillation (bordering on 600° Fahr.), the whole, or nearly the whole, of its volatile constituents are resolved into "these tarry vapours" of which he speaks, with the evolution of little or no gas. But as the temperature of the retorts is increased the tarry vapours are diminished, with a correspondingly increased production of gas; and when a high temperature is attained, a considerable quantity of gas with little tar is produced, and probably, with careful manufacture, tar might be almost avoided; indeed, on the authority of the elder Clegg, such a result was obtained with his web retort.

From this we find that the "tarry vapours" enter into the formation of the permanent gas, and that the latter is constituted entirely of the former. Under these circumstances I am at a loss to understand how our friend can come to the conclusion that the deposit of carbon is not obtained from the permanent gas. My impression always has been that the carbon deposit arose principally from the olefiant gas, which is more susceptible than any of the other hydrocarbons to the influence of high heat; and if this be correct, the illuminating power of the gas must be materially affected by the deposit of carbon.

As regards a perfect vacuum in retorts, it is simply an absurdity; for in the event of this occurring, the clay retorts would be smashed to atoms, and no possible luting for the lids could be obtained to stand against it. In my opinion, the terms vacuum and partial vacuum are not applicable in the operations of a gas-work, as vacuum represents a column of water of 30 feet, approximatively, whilst in the retort-house we speak of it as tenths of an inch, as "three-tenths of an inch partial vacuum," and this out of 30 feet is but a very small part of the whole. Why not generalize the word and say "*exhaust?*" Some of our modern writers employ it; and this word, in contradistinction to *pressure*, is, undoubtedly, very comprehensive.

NEMO.

SIR,—Mr. Cleland states, in his paper on "Economy of Force in Gas-Works," that by his plan there would be a saving in boilers, from the steadiness of the heat. A saving in stoking, and wear of furnaces and fire-bars, are likewise among the economical advantages offered by this use of waste heat in the generation of steam.

Mr. Cleland did not explain how he was going to increase the pressure or power of his steam, to overcome the fluctuations of the back pressure caused by the purifiers. As regards the saving in stoking, I ask, how will he feed his generators or boilers with water, how blow off, and what mechanical contrivance will he have to clean out his boilers? He would require a refrigerator, if he thought of doing it by manual labour. Then, would not the ordinary steam-boiler do best, the waste heat being used in the flues as a superheater, as Mr. C. recommends boilers that offer large heating surface? But that will be no saving, for there will be more surface for the sulphur compounds to play on, iron having such an affinity for sulphur.

Mr. C. said, "I hear the action frequently compared to 'Giffard's Injector.'" I have often heard that that was no French invention. A correspondent of the *Engineer* in 1862 wrote:—"I have discovered by chance, in a work on the steam-engine, written 30 years ago, the following passage: 'The high-pressure boiler employed in Mr. Trevithick's engines is supplied with water, previously heated in a separate vessel, by a small force-pump worked by the engine. In some of the improved, however, another and more ingenious mode has been adopted, the water being driven in by the action of a volume of highly expansive steam.'" This shows that the principle of the injector was known long before the introduction of Giffard's invention. I have often heard it vouched for that there is but one original idea in a century.

With this steam-jet exhauster, are we not drifting back to the time of the first steam-engine, invented by Hiero of Alexandria, 120 years B.C., and now forming one of our prettiest philosophical toys?

CHARLES A. MACKENROT.

9, *Canal Grove, Old Kent Road, Oct.* 23, 1875.

SIR,—In your impression of the 26th of October, we were favoured with an interesting letter from Mr. William Dunlop, under the above heading, in which that gentleman appears to me to have arrived at strange conclusions.

To quote the substance of several long paragraphs, Mr. Dunlop states that in a gas-work where the pressure to be overcome amounts to 13 inches column of water, which is equal to 1 inch in depth of mercury, if the barometric pressure were to fall 1 inch, say, from 30·5 to 29·5, as much gas would be made from a ton of coal in the latter case without an exhauster, as in the former case with an exhauster; in other words, when the barometer indicates 30·5 you might use the exhauster, and when it fell to 29·5 you might throw it out of action, for in each case the pressure on the retorts would be the same.

Mr. Dunlop further illustrates his argument by stating that one work at the level of the sea, with an exhauster removing 13 inches of pressure, and another at 900 feet above it, where the barometric pressure would be 13 inches less, and not having an exhauster, would be in precisely the same circumstances.

There is a show of truth throughout the whole of the statement, but the result arises, I think, from another cause—namely, that at the higher altitude, from the less pressure of the atmosphere, the gas will expand into a larger volume, just as a partially-filled bladder of air, when put under the dome of an air-pump, will, as the pressure of the atmosphere is removed, expand, and actually burst; in other words, a foot of gas at the level of the sea becomes a foot and something more as you ascend; so that really where a gas-work is situated several thousand feet above the level of the sea, you cannot get the same illuminating power from a foot of gas as you can lower down, because it represents a lesser quantity of matter—the particles are farther apart.

But it is not the pressure of the atmosphere which we remove from the interior of our retorts; it is the pressure of the apparatus—the friction of the gas passing through the pipes, through the lime or water, turning the meter, and lifting the gasholder, all which are constants, whether the works are high up or low down, whether the barometer indicates 28·5 or 30·5 inches of mercury. Hence it follows that, wherever the works are, you require an exhauster to remove that pressure, and prevent gas passing through the porous retorts; also, to prevent a portion of its carbon being deposited in the retorts in a crust. At the same time, it follows that the higher up the works are, all other things being the same, the greater will be the volume of gas extracted from a ton of coal, as the gas will be more rare, as the air is that presses on it.

I cannot help thinking that Mr. Dunlop would not have any objection to sign this letter, for he evidently knows too much of the physical laws, and that the way he has stated the matter requires clearing up, rather than that he really supposes that a thousand feet or so of altitude would enable him to dispense with the use of an exhauster.

If he really think so, let him try it; there are hills in Scotland high enough on which to try the experiment. All that I shall ask is, that he brings the gas down to the lower earth, so that it can be measured in accordance with the established laws of chemists.

London, Oct. 30, 1875. GEORGE ANDERSON.

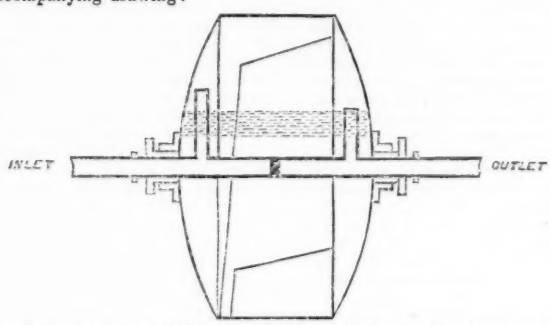
STATION-METERS WITHOUT CASES.

SIR,—I cannot refrain from expressing my admiration of the "system" proposed by "J. T.," whereby the *whole* of the case of a meter is to be dispensed with. It appears to me, however, that he has not carried his reasoning far enough, or he would have seen that a better result is to be secured by dispensing with the *drum* also, and so have neither drum nor case, for there happens to be just one trifling objection to his "system"—viz., that, however ingenious in its arrangements, and ornamental in its character, the drum might be, it would be altogether useless for the purpose intended. Has "J. T." thought anything about the quantity of water to be contained by the drum, the effect of its weight, the manner in which gas displaces it from the chambers under the usual conditions, the resistance which it offers to the motion of the drum, together with a few other little details? I fancy he has not; and until he has done so, I should certainly advise him to continue to keep clear of the Patent Office in respect to *improvements* in station-meters.

I write this while in the country, and under conditions which prevent me attempting to give any demonstrative facts or reasonings.

Oct. 29, 1875. F. W. HARTLEY.

SIR,—Since writing my last letter to you I have constructed a meter to work without a case, on the plan I then described, and find it works very satisfactorily, and the registration is perfectly correct. To show you the ease with which it works, notwithstanding the weight of water within the drum, and the friction of the stuffing-boxes, I may mention that a pressure of 1 inch is sufficient to drive it. My meter is necessarily constructed on a small scale, being the drum of an ordinary consumer's meter; but I apprehend that the same results would be arrived at on a large scale. The construction of the meter will be seen from the accompanying drawing:



To work the index I have a toothed wheel running loose on the shaft, and connected to the drum by a pin, which causes the wheel to revolve. The index can be connected to this wheel in any desired position.

J. T.

Oct. 29, 1875.

SIR,—In reply to "J. T.," we give an extract from the specification of Samuel Clegg's patent, dated 1816:—"This gauge consists of a hollow wheel or drum, capable of revolving vertically upon pivots, in the manner of a water-wheel; the hollow rim of the wheel is made close on all sides, to form a circular channel, which is divided by partitions into certain compartments or chambers to contain the gas, which is introduced into the wheel through one end of its axis, and carried off from the wheel through the other end." The measure, as is now generally known, formed a close annulus, and so had a water-line below the axis, the wheel could be fixed to the hollow shaft, and revolve with it as above described; but as "J. T.'s" suggestion is to employ the wheel as now constructed, Malam's "spout" must be used, therefore the wheel must revolve *on* the hollow shaft. In such an arrangement, the "friction-wheels" provided by Clegg for the axis to rest upon, so as to allow the wheel "to turn round with all the freedom possible," could not be employed, though "J. T." proposes to dispense with "a cistern containing water to take off part of the weight," as was arranged by Clegg. This, however, might be got over by placing friction-rollers under the wheel, supported by carriages. Here, then, it will be seen that the case does not only act as a cistern containing the water, but it supports the wheel, directly, carrying the "bearings" and the water, and indirectly, or less obviously, by immersion. We might also further add that the bottom of the case also serves as a foundation to carry the wheel, and the sides carry the index, connexions, and gauges. We will not enter into the matter of friction, or the action of the meter, purposely confining our remarks to the construction, and have endeavoured

to show that a meter without a case was one of the first ideas in the construction of these instruments, and that, as in our former letter, it was shown that the upper portion of a meter-case is necessary for accuracy in measurement, so the lower portion is also necessary to the economical mechanical action and construction of this simple and beautiful instrument.

WARNER AND COWAN.

Oct. 29, 1875.

Legal Intelligence.

SOUTHAMPTON BOROUGH QUARTER SESSIONS.

SATURDAY, OCT. 23, 1875.

(*Before the* RECORDER.)

SOUTHAMPTON GASLIGHT AND COKE COMPANY, *Appellants*, *v.* JAMES IRELAND, *Respondent.*

CONVICTION BY JUSTICES QUASHED.

Mr. BULLEN and Mr. M'CALMONT appeared for the appellants; Mr. KYDD, Mr. MATHEWS, and Mr. TEMPLE COOKE for the respondent.

This was an appeal by the gas company against a conviction by the magistrates of Southampton, sitting in petty sessions, and the circumstances of the case have been several times reported. It appears that a dispute occurred between Mr. Ireland and the company, in reference to his gas account for the quarter ending the 25th of March last. The meter had for a portion of that quarter ceased to register, and the company claimed to be entitled to charge Mr. Ireland—in accordance with certain regulations issued by them, and which they affirmed were binding upon him, inasmuch as he had signed a contract agreeing to them when he applied to be furnished with gas—the amount paid by him in the corresponding quarter of the previous year. Mr. Ireland, however, objected to this, urging that he had not used a gas cooking stove nearly to the extent he had in the previous year, but offered to pay the amount of the preceding quarter, which was some £2 less than that claimed. This the company refused to take, and, the account not being settled, they subsequently cut off Mr. Ireland's supply of gas. Mr. Ireland thereupon summoned them before the borough magistrates for illegally neglecting to supply him with gas, and the company, who appeared by their secretary to answer the summons, were not allowed to be heard, the bench deciding that the secretary, not being constituted the proper officer to be sued, had no *locus standi* in the case. Having, therefore, only the complainant's case before them, the magistrates convicted the company, and imposed upon them a penalty of 5*s.* a day during default in the supply of gas, amounting in the whole to £12. The company, of course, appealed.

Mr. KYDD, for the respondent, opened the case, and submitted that the Gas-Works Clauses Acts of 1847 and 1871 were incorporated in the gas company's own Acts of 1848 and 1865, the conviction having taken place under the Act of 1871. He also submitted that under their own Acts the company were bound to charge at per cubic foot for gas, and it was not competent for them to charge for a whole quarter a lump sum when a portion of that quarter was duly registered by meter; next that the words "corresponding quarter," as occurring in the company's regulations, standing by themselves, without any fixed and definite thing stated to which the correspondence was to relate, was a patent ambiguity; and next, that where the sum was in dispute, as was clearly the case here, the company's regulations ought not to be enforced. He referred at length to the case *Commercial Gas Company v. Scott*, as showing the application of the Act of 1871 to all existing gas companies. One of the provisions of this measure was that in all cases of dispute the matter should be taken before two justices for their determination, and this was the course, it was contended, the gas company should have adopted instead of cutting off the supply. He also referred to the case *The New River Company v. Mather*, where a similar mode of settling a question disputed between the undertakers and consumer was laid down as the right one.

The facts of the case and the correspondence being admitted, Mr. BULLEN asserting that the question for decision was clearly one of law only,

Mr. KYDD proceeded to refer to the several grounds of appeal, the first being that the conviction was defective and bad, in that the justices refused to hear the secretary of the company, Mr. C. C. Smith, in defence of the information. To this he submitted that the company, being a corporation aggregate, unless specially exempted, must appear by attorney. The summons was against the corporation itself, the company were not summoned to appear by their secretary, and they had the power of being heard in court by instructing an attorney under seal. Besides, assuming Mr. Smith, as he said, was secretary, the magistrates were not to know that.

The RECORDER: Supposing he was an attorney, neither would they know that.

Mr. KYDD: But then all the magistrates would be obliged to do would be to turn to the law list.

The RECORDER: That would not satisfy them.

Mr. KYDD: Assuming he was an attorney, and said so, he would have the means of proving it.

The RECORDER: I do not know what that method is.

Mr. KYDD: But assuming his name appeared in the law list.

The RECORDER: Then you must have evidence of identity.

Mr. KYDD: But *primâ facie*, if his name appeared in the law list, and he said "I am the man?"

Mr. BULLEN: All the correspondence is put in, and it is quite clear that Mr. Killby had previously frequently addressed Mr. Smith as the secretary of the company.

Mr. KYDD then referred to the other grounds of appeal. There were altogether eleven. Chief among them were—that the respondent was not entitled to a supply of gas from the company, not having complied with the conditions specified in section 2 of the Gas-Works Clauses Act, 1871, and, further, neglected and refused to pay the gas and meter rent due; that he was only entitled to such supply as a matter of contract, and that the company were not liable to penalties under the Gas-Works Clauses Acts, 1847 or 1871; that the company were entitled under section 16 of the Gas-Works Clauses Act of 1847 to cut off his supply of gas for his neglect to pay rent, &c.; the last one being that the penalty imposed by the justices was illegal, the information alleging but one day during which the offence was committed, whilst the penalty was for a default continuing over 48 days. Mr. Kydd urged that it was sufficient to allege but one day, providing the conviction as to other days was justified by what came out in evidence.

The RECORDER: Would not a defendant be put in difficulties in regard to his defence if summoned for one day only?

Mr. KYDD: But how far does that make the magistrates decision invalid?

The RECORDER: I cannot divide the conviction, you see.

Mr. BULLEN: We are fined for an offence which we are not called upon by the information to admit.

Mr. KYDD: But the company were not prejudiced—they might have had the case adjourned if they wished it. Besides, in the case quoted, the summons applied to one particular day only, the penalty for which was 40*s.*, and yet a fine of £10 was inflicted, founded upon the evidence given as to the number of days.

In further support of the respondent's case, Mr. *J. S. Eldridge*, magistrates clerk, gave certain formal evidence, and Mr. *Ireland* was also examined, and rather severely cross-examined by Mr. BULLEN as to his knowledge of the contents of the contract when he signed it. He said he was certain he did not read it when he signed it.

Mr. BULLEN: But how did you come to fill it up without reading it—the particulars as to residence, &c.?

Witness: There is no doubt I had an idea of what it was.

Mr. BULLEN (to the Recorder): If you look at this, sir, you will see how impossible it is he could have filled it up without knowing its contents.

The RECORDER: If Mr. Ireland signed it without reading it, he is still responsible.

Mr. BULLEN, addressing the court for the appellants, said he should begin by drawing attention to the first and last grounds of appeal, and he had no doubt one or other of these would be fatal to the magistrates conviction. In reference to the first—the refusal to hear the secretary—it was, he said, a rule strongly consonant with the feelings of Englishmen, that no person should be convicted unheard, preventing, as it did, the dealing out of hole-and-corner justice—or rather injustice. This being a penal proceeding, he should submit that the defendant had a right, by common law as well as by statute, to be heard by himself or his attorney or counsel; that Mr. Smith, the authorized servant and agent of the company, was the only person by whom they could properly appear, unless they called in an attorney to defend them; and that the justices, in the exercise of their discretion, did wrong, although he said this without imputing any improper feeling to them, in refusing to hear him. He dwelt strongly upon the fact that the secretary, in the present case, was personally served with the summons, and then read the shorthand notes of the proceedings before the magistrates, from which it was shown that objection was taken to Mr. Smith's appearance by Mr. Killby, and the magistrates refused to allow him to be heard other than as a witness, unless he could show a clause in some Act of Parliament enabling him to appear and conduct the case, although they offered him an adjournment, which he refused to take, asserting his legal right to be heard as the official representative of the company. Mr. Bullen referred to Jarvis's Act (11 & 12 Vict., chap. 43, sec. 12), authorizing a defendant to conduct his own case, and which, he said, gave a clear right to Mr. Smith to appear for the company.

Mr. KYDD quoted "Lush's Practice," to the effect that corporations could not appear except by attorney; but Mr. Bullen pointed out that this applied only to civil cases, and these proceedings were criminal.

Mr. KYDD submitted that they were not criminal in the sense in which the word was generally used.

The RECORDER: But if it were a penalty inflicted upon a private individual he would be liable to go to prison.

Mr. KYDD: This information, however, was not laid against Mr. Smith.

The RECORDER: But it was laid against a corporation of which he is the secretary. He tendered himself on behalf of the company, and the magistrates said, in effect, "You cannot appear."

Mr. BULLEN having further addressed the Recorder upon the first ground of appeal, after legal arguments upon either side,

The RECORDER said he had given the greatest possible attention to the case, and his opinion was that the magistrates should have heard Mr. Smith. Therefore the conviction must be quashed.

Mr. BULLEN: With costs, I assume?

The RECORDER: Yes.

Subsequently Mr. Kydd applied for a case for the court above, and the Recorder said if he had the power he would willingly grant the request.

Mr. BULLEN said he did not think the permission could be given without his consent, and he should not give it, for he thought it a most iniquitous proceeding against the gas company. He afterwards explained that there was no *certiorari*, and where this was the case there could be no appeal from that court.

The RECORDER said if Mr. Kydd could satisfy him he had the power to grant a case, notwithstanding Mr. Bullen's refusal of consent, he would grant him one, but he thought since Mr. Bullen's last statement Mr. Kydd would be satisfied not to apply.

HALIFAX COUNTY COURT.—WEDNESDAY, OCT. 27.

(*Before Mr.* GIFFARD, *Judge.*)

ACTION AGAINST THE HALIFAX CORPORATION TO RECOVER LABOURER'S WAGES.

Henry Ogden, a labourer, sued the Corporation of Halifax for the sum of £2, being a fortnight's wages in lieu of notice on immediate dismissal.

Mr. STOREY, who appeared for the plaintiff, said his client was employed originally as labourer, for which he received 3*s.* 4*d.* per day; afterwards he was put on as a gas stoker, and was paid at the rate of 5*s.* per day. He had worked at these two avocations for eight years—in the summer as labourer, and in the winter as gas stoker. On the 29th of July last he was ordered to paint the pillars and girders of the gasholders, which he declined to do, on the ground that he was not sufficiently paid for it, but would undertake to do it at 5*s.* per day. To this the gas manager, Mr. Carr, would not consent, but told the plaintiff that unless he did it at 3*s.* 4*d.* per day, his rate of wages at the time, he would have to go, and accordingly he was at once dismissed. A copy of the rules that were posted up at the gas-works was produced, and rule 6 stated that any man being drunk, or conducting himself in a disorderly manner, was liable to 14 days notice. There was no disorderly or improper conduct on the part of the plaintiff in this case, and he was entitled to recover for the wrongful dismissal.

The JUDGE admitted that he did not understand the nature of the work required of the plaintiff, but ruled that tarring or painting gasholder columns was not a labourer's job. The plaintiff was, therefore, justly entitled to whatever rate of pay he liked to ask, or to decline to do the job altogether. He thought the Gas Committee had been extremely ill advised in allowing the matter to come into court. He should give his judgment for the plaintiff for the amount claimed.

Miscellaneous News.

METROPOLIS WATER SUPPLY.

METROPOLITAN BOARD OF WORKS.

At the Meeting of this Board on Friday last—Sir J. HOGG, M.P., in the chair—the Works and General Purposes Committee presented the following Report on the Water Supply of the Metropolis:—

The committee have proceeded with the resolution of the board of the 8th inst., referring it to them to consider and report upon the advisability of introducing a bill into Parliament for amending the Acts for regulating the supply of water to the metropolis.

The reference to the committee relates only to the basis on which the consumers in the metropolis are or may be charged by the water companies for the water supplied to them. The charges made at the present time are, as the board are aware, regulated by the annual value of house property, and thus must unavoidably be subject to periodical fluctuations according as the value of house property is increased or diminished; while, on the other hand, the consumption of water need not necessarily vary. Moreover, the committee consider that the term "annual value" is in itself open to much question, nor has it, they believe, ever been judicially decided whether it means "gross" or "net" value.

It appears to the committee therefore desirable that the whole subject should be submitted to the consideration of Parliament in the next session, especially as there is reason to believe that the valuation lists of metropolitan property will show a very large increase in the value of house property, and consequently, should the existing basis of water-rate be retained, a greatly increased charge for water may be incurred without any corresponding increase in consumption.

The committee are also of opinion that the consumer should have the option of being supplied by meter, the charge being regulated by law, as is now done with gas-meters.

After a careful consideration of the reference made to them, the committee beg to submit the following recommendation:—"That the board do introduce a bill into Parliament to alter the terms on which water is supplied to the metropolis, the existing basis (annual

value) having been found to be uncertain in terms and unequal in results, and the water companies claiming to charge a higher rate when there has been no increased consumption; also to provide for the right of the consumer to be supplied by meter, and generally to make such amendments as the circumstances of the metropolis may require; and further recommending that the solicitor be instructed to retain such legal and scientific assistance as may be requisite in connexion with the bill."

Mr. RICHARDSON, in a long rambling speech, moved the adoption of the report. The necessity for the proposed legislation, he insisted, arose from the uncertainty of the term "annual value," and the unfair advantage taken of its ambiguity to increase the water-rates without any corresponding increase in the quantity of water supplied. He thought greater facility should be given to consumers to take their supply of water by meter, and said the committee saw no reason why the principle of the supply by meter should not be generally applied. The average power of a meter with a three-quarter inch bore and with a pressure of 50 feet would supply 600 gallons an hour; with 150 feet, 1200 gallons; and the average cost of each meter would be from £4 10s. to £5, which would not be much more than the charge for a gas-meter, and would not entail any largely increased rental over that charged for a gas-meter. This, however, would be the cost of a single meter; but if they were adopted by thousands, of course there would be a considerable decrease in the price. If water-meters were generally adopted throughout the metropolis, it would be a saving of money, and the consumer would be more careful of the water when he had to pay for the quantity actually used.

Mr. ROCHE seconded the motion.

Mr. H. L. TAYLOR said he could not help thinking that if the Board succeeded in obtaining the proposed bill it would be a great advantage to the Metropolis, and more particularly to the City of London, where there were many large warehouses for which enormous rents were paid, and the way in which they were rated for water, as estimated by the annual value, required the interference of Parliament to provide them with a remedy. He thought, to use an old saying, it would be as well that they should have "two strings to their bow," and that this Board should be associated with the Corporation of the City of London, for by going together to Parliament they would have a better chance of success. He did not know that the proposed legislation would be any injury to the water companies, but he would not now go into that question.

Mr. DRESSER ROGERS remarked that some persons outside might incline to the opinion that the Board were not going fast enough in reference to this question, and a very general desire existed in the public mind that the supply of water as well as gas should be in the hands of the Board. To him, however, it appeared that the progress made last year in the settlement of the gas question, by the kindly junction of the Corporation with the Board, was so satisfactory, that, if they only succeeded proportionately with this bill in the next session, very important results would be secured. But he believed that greater progress would be made, if they resolved to go direct to Parliament to acquire both the gas and water supplies at once. With reference to the operations of the water companies, he observed that in the City of London they had not carried out their powers to so great an extent as they might have done. Under the Act of 1852 the New River Company could charge, if they thought fit, a rate of 4 per cent. upon the increased rental, but their present charge was nothing like that proportion. Their powers also, in the case of water-closets and baths, were most preposterous. They could charge 2s. for a closet when there was only one in a house, and when there were two, three, or more, the increased charge was greatly in excess of that, while for baths they could charge as much as 12s. or 14s. He hoped that, by the joint action of the Board and the Corporation, some important changes in these matters might be made next session.

Mr. RUNTZ said the proposition, as far as it went, was all very well, but, in his opinion, more should be done. He thought the time had come when the supply of water ought to be in the hands of the local authority, and not in those of a public body, whose first consideration was to make a profit. Several commissions had reported respecting the subject, but he believed, when application had last been made, it was said the matter must be postponed until the great question as to the government of London could be settled. A large number of persons were interested in the supply of water to the Metropolis. Medical officers told them that the lives of the people depended, to a great extent, upon the water for drinking purposes being pure. If one thing had been made more clear than another during the past year, it was that typhoid fever was generated by drinking bad water; that the germs of typhoid fever were carried both in water and in milk adulterated with water. The supply of an article so necessary to life should be in the hands of a public body, who would have no necessity to study the question of profit. It was, therefore, desirable to seek control over the water companies. The Board had sent deputations to visit Manchester and Liverpool to see the effect of the introduction of hydrants, and although there had been no report as to the conclusions arrived at on that question, it was clear that neither of those towns could be a guide in reference to the Metropolis, because here there was no control over the water supply. Until that time came, the adoption of hydrants could not be proceeded with properly.

Mr. LLOYD had no doubt the time would come when both gas and water would be in the hands of the public authorities; in the meanwhile the proposition now made was a step in the right direction. The City of London was represented as being the greatest sufferers from the present system on which the water charges were now made; but he could state that the outskirts also suffered greatly from the same thing. Within a stone's throw of his residence there were two houses which had been built at the same time, contained the same number of rooms, and the same number of square feet, had been built from the same design, and finished off in precisely the same manner; yet, simply because one house, from its admirable situation, was assessed at £120 per annum, and the other, from its inferior situation, was only assessed at £65 per annum, the water charge in the case of one was double that of the other. Now, this he held to be a monstrous state of things. A charge by meter, by the number of rooms in the house, or by the number of the occupants, would be far more just than by the present system. The course recommended by the committee was a very simple and straightforward one, and he trusted the Board and the Corporation of the City of London would work harmoniously together to secure some alteration.

After a few words from Mr. WALKER,

Mr. LEGG said he was quite of opinion that it was not worth the while of the Board to spend the ratepayers money in going to Parliament on this question, as they would have no chance of succeeding in their object, for not one of the water companies charged the full sum they were entitled to charge by their Act of Parliament. There was no member of that Board who would say that the water companies were arbitrary in their proceedings, or at all rigid as to the supply of water to be obtained. As to the adoption of the meter system, why, the meter alone would cost as much, or more, than many small houses paid altogether for water; and as to a constant supply, what was the reason they did not have it? It was simply in consequence of the very expensive fittings, which would be necessary, and the water companies did not wish to force them upon those who were unwilling or unable to pay for them. The water companies were entitled to dividends at the rate of 10 per cent., but the dividends ranged from 7 to 5½ per cent. The Chelsea Company paid 6 per cent.; the East London, 6; the Grand Junction, 7 and 4½; the Lambeth, 6¾; and the Southwark and Vauxhall, 5¼. These were not high dividends, and he felt sure that Parliament would never interfere with the water companies, so long as they did not act arbitrarily, or charge up to the rate which they had powers to enforce, and any money spent by the Board in going to Parliament to obtain powers to deal with the water companies themselves would be thrown away. In the districts south of the Thames the companies were not charging anything like the rates to which they were entitled. The great evil at the present time was the enormous waste of water that took place.

The motion was then put and carried.

Mr. RICHARDSON moved that the matter be referred back to the Parliamentary Committee, with power to have a conference with the Corporation of the City of London and the water companies of the metropolis.

Mr. H. L. TAYLOR seconded the motion.

Mr. LESLIE: I consider this motion to be one of a perfectly revolutionary character. The proposal that the Metropolitan Board of Works, which includes the City of London, shall seek co-operation from the Corporation in the step about to be taken, is quite derogatory to our position. Are we to split ourselves in two to please the City? You sought their co-operation last session upon the gas question, and see what a mess you made of it. There was sent up to the committee, on behalf of the City of London, a Mr. Shaw, a very respectable man in his way, I dare say, but a most miserable——

Mr. NEWTON: I rise to order. I do not think a gentleman who represented the Corporation of the City of London in the House of Commons should, behind his back, be spoken of in the terms used by Mr. Leslie.

The CHAIRMAN: I must ask the honourable member to confine himself to the question.

Mr. LESLIE: You did not hear me out. I was merely referring to Mr. Shaw's evidence. I said he was a most respectable man, but then I say his evidence was perfectly ridiculous. And so it was felt throughout by the committee; it was second only to Mr. Newton's, and that failed from beginning to end. (Laughter.) You may laugh, but there was not a single point in his evidence, from beginning to end, that was not overturned. I heard it, and I have read it, and I say he knew no more about the question when he went before the committee——

Mr. LLOYD: Now I rise to order. The question before the chair is not the conduct of Mr. Newton in the parliamentary committee on the gas inquiry, and I think it is exceedingly improper for the honourable member to refer to it.

Mr. LESLIE: I have a right to object to this question being referred back to the committee.

The CHAIRMAN: The question of order has been raised, and I must say that the subject before the board is water, and not gas. While allowing some latitude to a speaker, I must at the same time request the honourable member to confine himself to the question, and not cast reflections upon other members.

Mr. LESLIE: I do not say anything about the respectability of the parties; I am referring to their evidence, and I say that neither Mr. Shaw nor Mr. Newton knew anything about the matter.

Mr. RICHARDSON: I rise to order again.

The CHAIRMAN: The question is whether this matter shall be referred to the Parliamentary Committee, with power to confer with the Corporation and the water companies. We are on the water question, and the speakers had better confine themselves to water.

Mr. LESLIE: I am on the question of water, with which you are going to do the same as you did last year with regard to gas. I object to your doing so, and I object further that you have no legal right to spend the money of the ratepayers in this way. I have read to you the words of an opinion, given by one whom you would all respect if you knew his name. ("Who is it?") And I say you have not the shadow of a foundation of right to spend a shilling of the ratepayers money in the proceedings you propose to take. What are you going to do? You are going to refer this question to the Parliamentary Committee—a committee who have failed in everything they have undertaken. They have largely expended the money of the ratepayers, and what good have they done? None at all. Surely, then, this is the time to object to entrust them with the question of the water supply. Mr. Walker has suggested that we should require water to be supplied to the consumers through meters. I think they have the power to do it, and I do not believe the companies would object to do so; and, therefore, to go to Parliament, at an extravagant expense, to obtain powers we already possess is absurd. The cost of a meter, Mr. Richardson tells us, to pass *six hundred gallons* of water an hour is——

Mr. ROCHE: Now I rise to order. The honourable member is discussing a motion we have already passed, with one dissentient. The question now is only whether, having determined to go to Parliament, we shall refer the matter to a committee.

The CHAIRMAN: The question upon which Mr. Leslie is speaking has been carried already by 25 to 1, and the motion now before the board is to refer the matter to a committee, with power to confer with the Corporation.

Mr. LESLIE: Why confer with the Corporation? Surely the City of London is already represented at this board, and they pay their proportion of the expenses incurred by us. Why should you make a distinction between the Corporation of the City of London and their Court of Sewers and the Works Committee of St. George's, Hanover Square? You are pandering to the City of London. Why? Because there are some 18 or 20 members of this board who are directly or indirectly connected with the City. Here is one member behind me (Mr. Roche) who is vestry-clerk to two parishes in the City.

Mr. ROCHE: I rise to order. The honourable member has no right to make personal allusions.

Mr. NEWTON: I must say a word upon the question of the reference. The principle has been already decided by a large majority—the only point now is, how the bill shall be drawn, and who shall conduct the parliamentary proceedings? Mr. Richardson proposes that it should go to the Parliamentary Committee, and that they shall be empowered to confer with the Corporation—*i. e.*, do as we did last year with the gas bill with very great success. (A laugh.) I think it is a very proper course to be adopted on this occasion. Mr. Leslie has made a comparison between the Corporation of London and the Vestry of St. George's, Hanover Square. Now, we know that the one body exercises great power and influence; the other is not active in this matter, except in so far as it is represented by Mr. Leslie. I think the proposed conference is very desirable, but it is not necessary to say anything further upon it. I rose because I did not wish to hear Mr. Shaw spoken of disrespectfully in his absence. For myself, I do not object to any remarks the honourable member may make. I am quite prepared to defend my conduct, and, as far as my evidence is concerned, I confess that I never felt so satisfied with it as I do now that it has become the object of his censure.

Mr. FREEMAN: I venture to suggest that the reference to the committee should be general, and not with limitations as to any particular course to be adopted.

The motion was then put and carried *nem. dis.*

A letter was read from the Kent Water-Works Company, transmitting notice of their intention to give a constant supply of water within certain portions of the company's water limits in the parish of Woolwich.

A letter was read from Messrs. Bircham and Co., transmitting notice by the East London Water-Works Company of their intention to give a constant supply of water from the 1st of March and 1st of April, 1876, to certain localities therein described in the parishes of St. John at Hackney; St. Matthew, Bethnal Green; and St. Leonard, Shoreditch.

These communications were referred to the Works Committee.

BIRMINGHAM WATER-WORKS.

Transfer of the Undertaking to the Corporation.

Meeting of the Company.

On Tuesday last an Extraordinary Meeting of the Birmingham Water-Works Company was held at their offices in Broad Street, to consider the agreement entered into by the directors for the transfer of the undertaking to the Corporation of Birmingham. Mr. G. Heaton occupied the chair.

The following report of the directors was submitted:—

Referring to the proposed sale of the company's undertaking to the Birmingham Corporation, your directors report as follows:—

The Birmingham (Corporation) Water Act, which received the Royal Assent on the 2nd of August last, enables the corporation, at any time within three years after the passing of the Act, by notice in writing, to require the company to sell their undertaking to the corporation for such consideration in perpetual annuities and on such terms as the company and corporation agree, or, in default of agreement, as may be settled by arbitration under the Lands Clauses Consolidation Act, 1845.

The annuities are payable half yearly on the 1st of January and the 1st of July, and are charged on the revenues arising from the water-works undertaking of the corporation, and on the borough fund and borough rate.

The corporation having given the statutory notice, and intimated their willingness to treat, your directors felt that, in the interest of the proprietors, they ought not to enter upon the uncertain field of an arbitration until they had endeavoured to come to terms by agreement. Negotiations, long and anxious, have taken place, and as the result of them a conditional agreement for the sale and purchase of the undertaking was entered into on the 7th inst., the terms of which are as follows:—

The sale to be as on and from the 1st day of January, 1876, and the consideration to be—

£54,491 perpetual annuities, the first half-yearly payment to become due on the 1st of July, 1876.

£3022 1s. 6d. (for winding-up purposes) payable in cash on the 1st of January, 1876. [This sum appears in the company's balance-sheet as capital not bearing interest or dividend.]

And such a sum in cash, payable on the 1st of March, 1876, as shall be equal to the dividend payable by the company for the current half year.

The £3022 1s. 6d. will, no doubt, be required for winding-up purposes.

The sum payable in respect of dividend, for the current half year, will be distributed as dividend in the usual way.

The £54,491 annuities were agreed upon as representing—

1. The statutory maximum dividend on all the capital of the company called up—*i. e.*:

£420,000, at 8 per cent.	£33,600	
£252,000, at 7 „	17,640	
		£51,240

2. Three per cent. per annum on the value as on the 1st of January next of uncalled capital (capital to remain uncalled), such value being ascertained on the footing that the capital would have been called up by five equal half-yearly instalments (the first payable on the 1st of July, 1876), and the capitalization of those five calls being calculated on a 4 per cent. basis—*i. e.*: Three per cent. on £84,000, payable by five equal half-yearly instalments, and capitalized at 4 per cent., equals an annuity of 2,376

3. Four per cent. per annum on the capital value as on the 1st of January next of one-half of the back dividends the company would have been entitled to pay out of future profits, such value being ascertained on the footing that such one-half of the back dividends would have been payable by nine yearly instalments (the first payable on the 1st of January, 1877), capitalization again being calculated on a 4 per cent. basis—*i. e.*: Four per cent. on £26,260 0s. 8d. (the amount of half the back dividends) payable by nine yearly instalments, and capitalized at 4 per cent., equals an annuity of 875

Total annuities. £54,491

The annuities are distributable among the proprietors according to their respective interests in the company, and your directors have caused careful calculations to be made for a rateable distribution among the several classes of shares, which calculations (excluding fractions of pence) result as follows:—

Each of the 9600 original and A shares of £25 (fully called up) carries an annuity of £2 1s. 1d.—*i. e.*:				
Eight per cent. on £25	£2	0	0	
Annuity attributable to share of back dividends	0	1	1	
	£2	1	1	
9600 shares at £2 1s. 1d. equals				£19,720
Each of the 9600 B shares of £18 15s. (fully called up) carries an annuity of £1 10s. 8d.—*i. e.*:				
Eight per cent. on £18 15s.	£1	10	0	
Annuity attributable to share of back dividends	0	0	8	
	£1	10	8	
9600 shares at £1 10s. 8d. equals				14,720
Each of the 9600 C shares of £20 (£15 called up) carries an annuity of £1 3s. 10d.—*i. e.*:				
Seven per cent. on £15	£1	1	0	
Annuity attributable to uncalled capital and share of back dividends	0	2	10	
	£1	3	10	
9600 shares at £1 3s. 10d. equals				11,440
Each of the 9600 D shares of £15 (£11 5s. called up) carries an annuity of 17s. 10d.—*i. e.*:				
Seven per cent. on £11 5s.	£0	15	9	
Annuity attributable to uncalled capital and share of back dividends	0	2	1	
	£0	17	10	
9600 shares at 17s. 10d. equals				8,560
				£54,440

It will be observed that the exclusion of fractions of pence, in calculating the annuities attributable to the various shares, leaves the company with an annuity of £51 at its disposal; and this annuity your directors unanimously recommend should be equally divided between your secretary, Mr. Thomas Starkey, and your engineer, Mr. J. W. Gray, as an acknowledgment of their able, indefatigable, and faithful services.

By the terms of the agreement, each proprietor is entitled at his option to take annuities attributable to his holding either in one aggregate annuity or in several annuities of such amounts as he may direct, and at all times hereafter to divide or consolidate his annuities, but so that the corporation shall not be called upon to grant an annuity of less amount than the maximum dividend payable in respect of some one of the company's shares.

Your directors part with a valuable undertaking—brought through many years of struggle into a prosperous condition—with deep regret. They did their best to retain it, but Parliament decreed that in the public interest the corporation should be entitled to call for its transfer. That call having been made, your directors have spared no labour in securing for the proprietors the terms now submitted—terms which they confidently and unanimously recommend to them for confirmation.

The Solicitor read the agreement entered into with the corporation.

The Chairman, in moving a resolution approving and confirming the agreement, traced the progress of the negotiations between the company and the corporation, referring, in the course of his remarks, to the growing tendency on the part of the Government and of the public to desire that the supply of such a prime necessity as pure water should be in the hands of local sanitary authorities, and maintaining that the company had done well in avoiding arbitration—which might have given £100,000 more or £100,000 less, but would have involved great expense—and settling the matter by negotiation, under which they had obtained the maximum sum which they were entitled to earn or take, secured upon the borough fund and borough rates, and therefore more secure than under the company's operations. In these negotiations the directors felt that the undertaking must, sooner or later, go to the corporation; and, having done all they could for the shareholders, they were still in the hands of the corporation to some extent, inasmuch as the latter had the power to take the works, whether the company were willing or unwilling, during the next three years, and the directors were unanimous in their recommendation. In conclusion, he bore testimony to the ability and energy with which the mayor had endeavoured to promote the interests of the town and corporation, to the great courtesy and consideration of Alderman Avery, and to the hearty and cordial support he had received from his co-directors.

Mr. Chesshire seconded the motion, which, after the Chairman had replied to several questions by shareholders, was put and carried unanimously.

The Chairman moved another resolution in favour of the adoption of the directors' report and the distribution of the perpetual annuities to be granted by the corporation among the proprietors and the company's secretary and engineer, Messrs. T. Starkey and J. W. Gray, in the proportions and manner set forth in the report. In doing this, he said, no one apart from the directors themselves knew the services which these two officers had rendered in the matter.

Mr. Edwards seconded the proposition, which was also unanimously agreed to.

On the proposition of the Chairman, a third resolution was passed, empowering the directors to take all the necessary steps to carry out the transfer.

On the proposition of Mr. Edwards, seconded by Mr. Gresswold, and supported by Mr. J. B. Stone—who expressed a hope that the shareholders would have another opportunity of expressing their appreciation of the services of the chairman and directors—a vote of thanks was passed to the chairman for his services that day and during the negotiations.

Meeting of the Town Council.

A Special Meeting of the Town Council was held on the same day—the Mayor (Alderman Chamberlain) presiding—to receive and consider a report by the Water Committee, with reference to the purchase of the undertaking of the Water-Works Company.

The report, which is of considerable length, sets out the negotiations between the Water Committee of the corporation and the company, together with the terms of the provisional agreement entered into for the purchase of the works. Those terms are given above in the report laid before the shareholders, and need not be repeated. The committee close their report by remarking that they "are of opinion that the terms thus mutually agreed upon are equitable, and that while they give to the company the 'full and fair' price suggested by the select committee of the House of Lords, they are fair, and will ultimately be advantageous to the corporation, and they therefore recommend them for the approval of the council."

Accompanying the committee's report, is a report by Messrs. Laundy, Harrison, and Co., public accountants, who were instructed by the committee to examine the books and accounts of the company, and to report as to the present condition of the undertaking, as to the profits from the year 1873 to the present time, the future prospects of the company, and generally on the subject. The report is of great length, and deals in much minuteness with each of the questions submitted, the general summary being as follows:—

We have, as directed, fully considered the prospects of the company in the light of the data which we have been enabled to obtain, and we are deliberately of opinion—

1. That a large sum, which has hitherto been added to capital, will, in the future, have to be charged to revenue, probably to the extent, to commence with, of at least £2000 per annum.

2. That the progress of the company since June 30, 1871, implies that an addition of about £3000 may be added to the rental annually, so long as the population continues to increase in its past ratio.

3. That such increase in the rental must be attended with some outlay of capital, and an increase of revenue expenses.

4. That the present revised and largely increased rates charged cannot materially be exceeded, and that the present standard of management charges will probably have to be raised, and this after assuming that £900 per annum for directors fees will be discontinued.

5. That for some years it will be unreasonable to expect, in the face of the fluctuations which the past reveals, a larger profit than £50,000 per annum on the present outlay of capital, and this without providing for any exceptional catastrophe or loss.

6. That a reserve should be provided out of profits annually as a provision against defalcations, strikes, losses, breakage of machinery and mains, bursting of reservoirs, compensation for damage, pollution of water, and any other calamity, as well as to provide against the wear and tear of plant, machinery, &c., which is continually going on.

7. That the policy of the directors of the company has been to relieve the revenue by charges to the permanent additions to capital, and so increase the dividends payable to the shareholders.

The Water Committee, in their report, state that with relation to appropriations of expenditure to capital account, which is referred to in the last paragraph of the accountants report, and which, it is alleged, should properly have been charged to revenue, they thought it right to communicate with the chairman of the water-works company. They set out the correspondence which took place on the subject, and at the close they say that the explanation of the company was considered satisfactory.

The committee state that they instructed Mr. Easton, C.E., under the direction of their chairman, to examine and report (1) as to the capabilities and general condition of the works and undertaking of the water-works company, (2) as to whether such works are, at the present time, in full and complete efficiency, and equal to the requirements of the town, and (3) generally on the subject.

Mr. Easton's report, which is appended, gives the result of his examination of each of the different stations of the company. He reports the capabilities of the works, as regards the quantity of water available, as follows:—

	Gallons		Gallons.
From Wells—			
Aston Wells	3,000,000	daily.	
Short Heath	2,500,000	„	
Perry Wells	2,000,000	„	
King's Vale	300,000	„	
Selly Oak	1,500,000	„	
		..	9,300,000
From Streams—			
Perry and Witton	1,000,000	„	
Plant's Brook	2,500,000	„	
Blythe	2,500,000	„	
Bourne	2,000,000	„	
		..	8,000,000
Total			17,300,000

In consequence of there not being duplicate pumping machinery at all the stations, and no engine at Selly Oak, the quantity that can be relied upon at the present time for distribution to the different districts is estimated as follows:—

From Wells	4,800,000	gallons.
From Streams	4,000,000	„
Total	8,800,000	gallons.

The latter quantity, Mr. Easton states, is more than sufficient for the supply of the population now served by the company, which requires eight million gallons daily, and the former is more than sufficient to supply the whole populations of the districts comprised within the limits of the Act—say, 481,000, at 30 gallons per head, or about 14½ millions daily.

As regards the second head of inquiry, Mr. Easton reports that the quantity

of water is ample, and that the works, as far as they go, are in a state of complete efficiency—*i.e.*, they are in good and substantial working order, but to render them equal to the requirements of a town like Birmingham, he is of opinion that they must be modified so as to carry out the following principles:—

1. All the water derived from streams should, after storeage, be properly filtered before distribution.

2. All reservoirs into which water is pumped for distribution, whether from wells or after filtration, should be covered.

3. There should be duplicate machinery capable of pumping the daily supply at least.

With reference to the third point of inquiry, Mr. Easton says: "I have to report that, with the exceptions I have just alluded to, the whole of the plant and works are of first-rate quality, and the sites of the different stations and reservoirs generally very well selected. And I may, perhaps, be permitted to say that, in my judgment, the whole undertaking reflects great credit upon the directors of the company and their able engineer, Mr. Gray.

In a letter addressed to the chairman of the committee (Alderman Avery), Mr. Easton says:

The chief points that have struck me in thinking over the matter before writing the report are:—

1. That I am pretty certain that the supply from the sandstone is by no means exhausted, and that the existing wells might easily be made to deliver more water—notably, King's Vale, Aston, and Perry.

2. That if it were desired to supply nothing but well water for the domestic service, it not would be difficult to arrange the works so that the Plant's Brook and Whitacre Pumping Stations should serve all the large consumers at a cost probably not exceeding £100,000.

3. That I do not believe such a course would be the right one, but that if the Blythe were given up and the rest of the water properly filtered and mixed with the sandstone water in covered reservoirs, a very excellent quality would result, probably better for general domestic purposes than the water from the wells alone.

4. That in this view, the works of the company, when finished, will need very little alteration for many years to come, and will only require the additions I have referred to in my report, of the covering of the reservoirs and the erection of duplicate machinery. This latter will be provided at the Aston Wells, when the engine now erecting is finished; but there should be a pair of engines erected at Selly Oak. Mr. Gray's suggestion of covering over part of the Aston reservoirs and of utilizing another part as filtering-beds for Perry and Witton Brook, if carried out, will provide for the other want. I should put the cost of these works at from £35,000 to £40,000.

5. That, in considering the price to be paid for the works, the large quantity of freehold land, some of it in close proximity to the town, and all of rapidly increasing value, must not be lost sight of. It is possible that it would be worth while to abandon the Witton or Perry Brook, or both, and sell the land to convert it into ground available for public purposes. I believe the wells, Plant's Brook, and the Bourne will serve all your requirements for many years to come. I have no doubt you have not forgotten that when the Erdington reservoir is completed at least half the present district can be served direct from Witton well, Whitacre, and Plant's Brook without going to Aston. This at once makes the Aston pumping station equal to any service it is likely to be called upon to perform. There will also be a great saving in fuel, as besides the extra friction of the double pumping, at least one-half of the water will be lifted 100 feet less than it is at present. I believe that the same principle may be carried out still farther, and that when the Selly Oak engine is erected, the pumping station at Monument Lane could be dispensed with; but as to this I should not like to give a decided opinion without looking more closely into the subject.

Altogether, as you may gather from my report, and from these remarks, I have been very favourably impressed with the property you are about to acquire, and I believe that, with judgment in carrying out the alterations and extensions, you will soon make these works very remunerative, even at the price, which now seems excessive, but which, if all things are put properly before the arbitration—and of this there is, I expect, little doubt—it is not at all unlikely will very nearly be realized by the company. Looking at the delay and uncertainty of an arbitration, and the annoyance and ill-feeling it is sure to occasion, I am sure you will be doing right to close with the company on the terms you mentioned to me.

Alderman AVERY, in an exhaustive speech, for which we have not space, moved that the agreement between the proprietors of the Birmingham Water-Works and the mayor, aldermen, and burgesses of the borough of Birmingham, dated the 7th of October, 1875, for the sale and purchase of the undertaking of the water-works company, be confirmed; that the Water Committee be authorized to take the necessary measures for carrying the agreement into effect, and the payment of the consideration money and the granting of the annuities; and that, after the completion of the purchase, the committee be authorized and instructed to take the management of the undertaking, with all the powers that might be conferred on the council by the Birmingham Corporation Water Act, 1875, reporting to the council from time to time thereon. In closing his remarks, he said he thought the council should be informed of the uninterrupted increase of the revenues of the company, and of the dividends earned. They would be able to form an idea from the following table:—

	Gross Water Rentals.	Net Profits.
1844	£9,104	£5,414
1854	18,311	9,014
1864	36,873	19,118
1874	84,237	47,739

Thus they would see that every ten years the amounts systematically doubled themselves. During the half year ending June 30, 1875, the profits were about £25,500. This was such a proof of steady, uninterrupted growth that, even if the corporation were giving too much, they need have no fear for the future. They would have a large increase of profit on capital expended, and a perpetual growth of the population; and it, therefore, appeared tolerably clear that if there was any loss it would be very small, and that it would not extend beyond two or three years. He was not sure that there would be any loss at all from the beginning. In addition, the corporation would be enabled to carry out all kinds of sanitary reforms, which they earnestly desired to do, and which it was their imperative and plain duty to carry out, and which they could not carry out without the control of the water supply, except by giving an enormous premium to the already enormous profits enjoyed by the company. He believed every member of the committee was convinced that the proposal now submitted to the council, though the terms were good for the company, contained terms which they should accept, which were fair and equitable, and which would be ultimately for the advantage of the corporation.

Alderman MANTON seconded the motion, which was spoken to by the mayor and several members of the council.

The resolution, when put to the vote, was carried unanimously.

BIRMINGHAM CORPORATION GAS-WORKS.

[From the *Birmingham Daily Post.*]

All the necessary arrangements to give effect to the Corporation Gas Act being now completed, and the works of the Birmingham and the Staffordshire Gas Companies having now passed into the actual possession of the corporation, it may not be uninteresting to the ratepayers to learn something about the magnificent property they have acquired, and to be made acquainted with the means available for lighting the town, and also for yielding a handsome revenue in aid of the local rates.

There are five gas-works included in the purchase. Two of these, in Windsor Street and Fazeley Street, belonged to the Birmingham Company, and with them is connected a storeage station in Gas Street, Broad Street. The other three belonged to the Staffordshire Company—namely, those at Saltley, in Adderley Street, and at West Bromwich, or to speak exactly, at Swan Village. The Windsor Street and Fazeley Street stations are used for manufacturing purposes, and Gas Street for storeage only. The area of the Windsor Street works is over 9 acres; Fazeley Street has an area of nearly 2 acres. There are 11 gasholders at Windsor Street, three at Fazeley Street, and three small ones at Gas Street. The aggregate storeage capacity of these reservoirs is 3,400,000 cubic feet; the consumption of gas varies from 4,700,000 feet per week day, in winter—the week before Christmas Day is the heaviest—to 800,000 feet per week day, in summer. To produce this supply nearly 800 retorts are in use, each, be it remembered, with a double mouthpiece; 189 miles of mains, varying from 2 feet 6 inches to 2 inches, are used for the delivery; there are 16,000 customers to be supplied; about 500 men, stokers, wheelers, &c., are occupied in the manufacture, and about 91,000 tons of coal are used annually—chiefly Derbyshire, with some South Staffordshire for special coking purposes, and Welsh cannel to maintain the illuminating power, especially in winter, when, owing to the cold, the process of condensation goes on more rapidly. Besides the gas, the quantity of coal above mentioned yields other valuable products—last year, for example, 41,000 tons of coke and breeze (small coke) were produced; 1 million gallons of tar, which is taken by a large maker of pavements; 2,500,000 gallons of ammoniacal liquor, water impregnated with ammonia, sulphur, &c., which is sold to chemical manufacturers for making sulphate of ammonia, to be used as manure. As to the gas itself, the greatest possible daily make at Windsor Street is 4 million feet, and at Fazeley Street 900,000 feet. Last year the actual total make was at Windsor Street 626 million feet, and at Fazeley Street 172 million feet; together, 808 million feet. The Windsor Street works supply gas to the centre, the north, and the west of Birmingham, and the Fazeley Street works chiefly to the south and east districts. The Birmingham Company's supply is confined to the borough. To these particulars we have only to add that the Windsor Street works, amongst the best of their class, are admirably arranged, and kept in excellent order, under the direction of Mr. Hunt, by whom they were remodelled and extended for the Birmingham Company.

The chief station of the Staffordshire Company at Saltley is under the direction of Mr. Hack. The works of this company are much larger in all respects than those of its former competitor. They are three in number—Saltley, with an area of 17 acres, with 30 acres additional, now acquired for new storeage reservoirs or gasholders; Adderley Street (the original, or, as they used to be called, the Pagoda works), 4½ acres; and West Bromwich, or Swan Village, 24 acres; with a small storeage station belonging to the last named in Jervois Street, West Bromwich. The productive capacity of these works is as follows:—Highest daily make of gas: Saltley, 5¼ million feet; Adderley Street, 2 million feet; West Bromwich, 2¾ million feet. The actual make of gas at the three works, last year: Saltley, 741½ million feet; Adderley Street, 463 million; West Bromwich, 432 million—a total of 1636½ million feet. The storeage capacity of the three works or stations is as follows:—Saltley, four gasholders, capable of containing 4½ million feet; Adderley Street, five gasholders, containing 1½ million feet; West Bromwich, eight gasholders, containing 2 million feet. The present aggregate storeage power of the Staffordshire Company is therefore 8 million cubic feet. The Saltley gasholders are the largest we have, and it may be interesting to give their sizes and their capacities in cubic feet. These particulars can be most conveniently stated in a tabular form:—

	Diameter. Feet.	Height. Feet.	Cubical Contents. Feet.
No. 1 telescopic	148	31	1,066,500
,, 2 single	187	41	1,130,000
,, 3 single	187	42	1,164,000
,, 4 telescopic	160	32	1,250,000

The last-named gasholder is not quite finished; but will be ready for use in a week or two. The cost of such a gasholder as this is about £25,000. The largest quantity of gas supplied in any one week day last year from the three works was 10 million feet; the smallest supply was 1½ million feet.

The manufacturing means of the Staffordshire Company consist of 584 retorts at Saltley, 230 at Adderley Street, and 330 at West Bromwich—total, 1144, each having two mouthpieces. At the Saltley works a new retort-house, of unusually fine proportions, has been recently constructed. It is 108 feet long, 124 feet wide, and 27 feet high to the wall-plate, and contains 147 retorts. It is proposed to extend this building by an addition of 190 feet, making a total length of nearly 300 feet, and making a total provision for 480 retorts, which will be equal to an increase of 30 per cent. on the present productive capacity of the Saltley works. Other improvements are in contemplation, which, together with the addition above noticed, will raise the productive power of these works by about 40 per cent.

The number of men employed by the Staffordshire Company is about 800 when at full strength: these are chiefly stokers, or feeders; the wages of this class are about 5s. per day, of 12 hours, with an allowance for meal times, and rests between the various chargings of the retorts, thus bringing the actual working hours to about six per day. The coal consumed for the three works is about 200,000 tons yearly; and from this, besides the gas, is produced about 100,000 tons of coke. Last year the quantity of tar yielded was 2,148,000 gallons; and of ammoniacal liquor (which is rather weaker than that supplied by the Birmingham Company) 7,500,000 gallons. For the supply of gas there are belonging to the Staffordshire Company 400 miles of mains, ranging from 4 feet to 2 inches in diameter. The number of customers supplied may be roughly stated at about 30,000. The supply districts are arranged in the following order. From Saltley works: Birmingham, Aston, Gravelly Hill, Erdington, Smethwick, Harborne, and Handsworth. From West Bromwich works: West Bromwich, Walsall, Wednesbury, Darlaston, Tipton, Oldbury, and part of Handsworth and Smethwick. From Adderley Street: part of Birmingham, Moseley, King's Heath, King's Norton, Balsall Heath, and Acock's Green.

We have now stated the main facts relating to the works of the two companies. Taking them together, as the property of the corporation, let us now see what the Gas Committee has under its direction, and what are its means of supplying the requirements of the town, and of making profits for the ratepayers. The purchase from the two companies gives the corporation five separate gas-works, occupying about 56 acres of land, employing 1500 men, consuming nearly 300,000 tons of coal annually; and producing 2,444,500,000 cubic feet of gas, 140,000 tons of coke, over 3 million gallons of tar, and about 10 million gallons of ammoniacal liquor, all of them most valuable products, and readily saleable. The highest possible daily make of gas with present means is 14,900,000 feet, but this, of course, cannot be achieved, except occasionally, and under extreme pressure. The total present storeage capacity is 11,400,000 feet. The largest quantity required by the district on any one day last year was 14,700,000 feet, a considerable excess over the total storeage capacity, so that if the works were stopped for a few hours, the reserve of gas would be exhausted, and Birmingham and the district would be in darkness; indeed, one day last winter we were within two hours of this dismal condition. It is evident, therefore, that both the manufacturing and the storing capacity of the works must be largely increased. The population to be supplied is little under a million, and is rapidly growing; and the consumption of gas nearly trebles in 20 years. To these matters, consequently, the Gas Committee, under the chairmanship of the mayor, is directing its attention; and we have good reason to believe that in a comparatively short period the gas-works will be greatly extended, and rendered in size and power what they are now in quality, amongst the most important in the kingdom. The committee also propose to re-arrange the supply districts, so as to give each gas-making station a district to itself, lying most conveniently for distribution. This, of course, was impossible when the works were in the hands of competing companies, but it can be readily done now that they are in one ownership and under one direction. When the re-arrangement is effected, it will save double mains, and will lessen the distance the gas has to travel—thus reducing friction and leakage, a most fruitful source of loss by waste, amounting now to rather more than 7 per cent. on the make of gas. The importance of

this reform will be seen at once when we state that the reduction of leakage by 2½ per cent. will save more than £10,000 a year; and there seems a possibility that it may be brought down as low as 3 per cent., which would give a saving of £15,000 a year—something really worth striving for. Other reforms are contemplated by the committee, which will still further reduce the cost of production, delivery, and management; and to aid in the onerous labour of supervision a new form of weekly account has been devised. This form, which seems perfect, gives at a glance the working cost of each station, the materials consumed, the products yielded, and the prices realized. Another improvement, designed for the special advantage of the consumer, should also be mentioned: this consists of a card to be hung beside every private meter, and so arranged that, when filled up from time to time by the meter inspectors, each consumer will be able to see a a glance how much gas he is using—in fact, the meter will be "read" and registered for him.

The last note we have to make is as to the cost of the purchase, and the probable profits to the corporation. The Birmingham Company's works were bought for a direct payment of £450,000; the Staffordshire Company's for an annual payment in corporation bonds of £58,000, equal at 25 years purchase of about £1,500,000. The annual charge to the borough, which can borrow cheaply, may be taken at £70,000. The estimated profit for the ensuing year enables the corporation to reduce the price of gas 3d. per 1000 feet, equal to an amount of £30,000 a year—a penny per 1000 feet meaning about £10,000 a year—and besides this the mayor expects to carry a sum of £25,000 to the credit of the improvement-rate, being equal to about 6d. in the pound on that rate. Beyond this we need not go at present in the estimate of profit; the result stated being enough to show that Birmingham has made a good purchase, much to the credit of those who negotiated it and carried it through, and promising, under good management, to yield solid advantages in the future both to the ratepayers and to the consumers.

INSTITUTION OF CIVIL ENGINEERS.

The Council have issued a list of subjects upon which they invite communications for the session 1875-76. Among others are the following:—

"On the Flow of Fluids, liquid and gaseous."

"On Portable Apparatus for Gauging the Materials, and for the Expeditious Mixing of large Quantities, of Portland Cement Concrete."

"On the Value and Strength of the different Materials used for making Concrete; with Experiments on the Proper Proportions of the various Ingredients, and of the Water, whether Salt or Fresh, to produce the Strongest Mixture."

"On the Application of Steam Machinery for Excavating, and the Cost as compared with Hand Labour."

"On the Water Supply of Towns, including a description of the Sources of Supply, of the different Modes of Storing, Collecting, and Filtering Water, of the various incidental Works of the Distribution to the Consumers, and of the General Practical Results."

"On the Constant Service of Water Supply, with special reference to its Introduction into the Metropolis, in Substitution for the Intermittent System."

"On the various Modes of Dealing with Sewage, either for its Disposal or its Utilization."

"On the relative Cost of the Conveyance of Coal by Rail and by Steamer, and on the best Mode of Loading and Unloading to diminish Breakage."

"On the various Descriptions of Pumps employed for Raising Water or Sewage, and their relative Efficiency."

"On the Use of Gas as a Motor."

"On the 'Output' of Coal in the United Kingdom, as compared with that of other Countries, illustrated by Statistical Tables, Plans, and Diagrams, showing where Coal is Produced, and where and how it is Consumed."

"On the Washing of Small Coal, and the Manufacture of Coke and of Artificial Fuel."

SINGAPORE GAS COMPANY, LIMITED.

An Extraordinary General Meeting of this Company was held at the London Tavern, on Tuesday, Oct. 26—H. P. Stephenson, Esq., in the chair.

The Secretary (Mr. R. King) having read the notice convening the meeting, the following report and statements of account were presented:—

The directors have the satisfaction of reporting continued progress in the lighting of Singapore, for particulars of which they refer to the report annexed, from their engineer and manager, Mr. E. J. Wells, dated Aug. 26, 1875.

The balance-sheet to June 30, 1875, and appended to this report, shows the financial position of the company. The directors have written off for depreciation of works and plant, and off the expenses of first establishment, as per balance-sheet, at the rate of one-half per cent. per annum. The profit of the half year after writing off these sums, amounts to £2033 12s. 3d., which together with £38 2s. 7d. the unappropriated profit of the preceding half year, makes the available balance £2071 14s. 10d.; out of this sum the directors recommend the declaration of a dividend at the rate of 7½ per cent. per annum, less income-tax, on the amounts paid up on the preference and original capital; the balance of £27 1s. 1d. to be carried forward to the profit of the succeeding half year.

The dividend to be payable on the 20th of November.

Report of Engineer and Manager.

To H. P. Stephenson, Esq., Chairman, and the Directors of the Singapore, Gas Company, Limited.

Gas-Works, Singapore, Aug. 26, 1875.

Gentlemen,—I have now great pleasure in laying before you my half-yearly report, and forwarding all the several statements of accounts, balance-sheets, &c., showing the working for the half year ending June 30, 1875.

The progress made in lighting, and the steady increase in the gas-rental, I feel fully persuaded will be satisfactory to the directors and shareholders.

At the present time, I do not think it would be out of place to make a few remarks upon the general progress, and also upon the way comparisons should be drawn, showing the increase or decrease in the gas-rental.

I have not the least doubt that many shareholders think that the increase in the gas-rental should be more rapid than it is, taking into consideration that we are constantly fitting up new houses and fixing additional lights. There are various disturbing influences at work in the East, some of which do not materially come under notice in English towns, which must be taken into consideration—viz., unoccupied houses, removals, houses closed on account of Europeans and natives leaving the settlement, the Chinese theatres are not open all the year round, at certain seasons of the year trade is dull; then the consumers, both Europeans and native, economize the consumption of gas, and they quite understand how to do this. It is generally supposed that darkness sets in at Singapore at the same time all the year round, this is not the case, there being nearly three-quarters of an hour variation, that is, at one portion of the year it is dark sooner and light earlier in the morning, and *vice versâ;* this also causes a fluctuation in the monthly gas-rental. In a mixed population, like that at Singapore, constant changes are going on, to a greater extent than in European towns. The above, and a variety of causes which are known only in towns similarly situated to Singapore, clearly show that in order to ascertain what progress is being made in gas lighting, comparisons made monthly will form no criterion. The gas-rental should be compared half yearly, and with the corresponding half year. It may also be remarked, because there are a great number of lights fixed the rental should be higher; in English towns the number of lights may be a criterion, but this can never be the case in towns where the larger proportion of the consumers is native. The natives, being fond of show, have a far greater number of lights fixed than are used nightly, the whole number of lights being used only on festivals and special occasions.

The following figures, compared with corresponding half years, will show that the company is progressing satisfactorily. Increase in private gas-rental (without including gas for illuminations), half year ending June 30, 1875, over June 30, 1874, 1519.60 dols.; increase half year ending June 30, 1874, over June 30, 1873, 885.24 dols.; increase half year ending June 30, 1875, over Dec. 31, 1874, 562.87 dols.; increase half year ending June 30, 1874, over Dec. 31, 1873, 356.19 dols.; increase for the year ending Dec. 31, 1874, over Dec. 31, 1873, 2192.16, or at the rate of 182.68 dols. per month; increase for the year ending June 30, 1875, over the year ending June 30, 1874, 2826 52 dols., or at the rate of 235.54 dols. per month.

The above returns show the increase in what I call the legitimate gas-rental, that is exclusive of gas-rental for illuminations, which only occurs in the half years ending the 31st of December. In addition to the above for the half year ending the 30th of June, 1875, there is an increase in the public lamp gas-rental of 471.17 dols., making a total increase in gas-rental over the corresponding half year of 1990.77 dols.

I regret that the rates of exchange for remitting during the half year have again been very unfavourable, not exceeding 4s. 2¼d. for six months bills. I fear during the next half year the accounts will show still further losses on exchange, the present rate being only 4s. 1¼d. for six months bank bills, and the company have a balance of 6500.00 dols. at the bankers to remit.

In the carbonizing department the resetting of Nos. 4 and 5 benches of retorts, with seven oval retorts in each, are completed. The erection of the two new benches of retorts has been commenced, which, when completed, will be of great advantage, affording greater facilities for effecting repairs in the existing benches.

All the apparatus and gasholders are working satisfactorily, and the company is in a good position for yield and supply of gas. After the completion of the new benches of retorts, the only expenditure for some time to come will be that required by the ordinary wear and tear.

The extension of mains for the new lamps is now being rapidly carried out in the River Valley Road and Campong Malacca districts. The municipal engineer has also instructions to report upon some other streets to be lighted where the mains are already laid. On April 23, 20 of the additional lamps ordered by the municipal commissioners in different parts of the town, were lighted, making at present, 421 public lamps nightly burning gas.

Thirty-eight new houses have been fitted with burners during the half year, and, with additional burners fitted to houses already consuming gas, make a total of 431 burners, and, in addition, two contract lamps. The fitters continue to be fully employed, and as usual, at this time of the year, about 15 days have to be given up for the erection and removal of illumination devices used in the Chinese festivals.

The gas has been kept free from impurities, and the illuminating power maintained at 15 candles. The two photometers have been used during the half year, 142 observations having been made.

(Signed) E. J. Wells, Manager.

Balance-Sheet, June 30, 1875.

Dr.				*Cr.*		
Capital—				Cash at bankers, London and Singapore	£2,422	13 0
£5 paid on 2000 preference shares	£10,000	0	0	Ditto in hands of secretary	6	10 0
£5 paid on 8849 ordinary shares	44,245	0	0	Bills receivable	2,400	0 0
£4 paid on 200 ordinary shares	800	0	0	Office furniture	144	14 6
£2 paid on 25 ordinary shares	50	0	0	Cost of works & plant, as per last statement £33,984 11 11		
£1 paid on 50 ordinary shares	50	0	0	Add, extensions during the half year 703 1 4		
				£34,687 13 3		
11,124 shares	£55,145	0	0	Depreciation at the rate of ½ per cent. per annum 84 19 3		
Debenture bonds	6,520	0	0		34,602	14 0
Sundry creditors	1,004	8	8	Purchase of land	1,118	2 8
Insurance reserve-fund	50	3	7	Retort account	1,007	7 6
Profit and loss	2,071	14	10	Meter renewal account	170	13 1
				Stock on hand	8,367	4 4
				Amounts charged to capital for travelling expenses, rent, preliminary expenses, and interest on capital during construction £10,340 5 11		
				Less amount previously written off 553 13 3		
				£10,286 12 8		
				Less amount written off this half year, at the rate of ½ per cent. per annum 27 0 0		
					10,259	12 8
				Gas, meter-rental, fittings, and sundries under collection to June 1	1,514	2 9
				Gas, meter-rental, &c., for the month of June, and gas for public lamps for the half year	2,430	15 10
				Sundry debtors	195	4 6
				Travelling expenses, suspense account, and sundries	151	12 3
	£64,791	7	1		£64,791	7 1

Profit and Loss Account, from Jan. 1 to June 30, 1875.

Coal carbonized	£2,584	4	9	Balance at profit and loss, Dec 31, 1874	£1,990	17 1
Lime and oxide	19	10	5	Less amount declared as dividend, after deducting income-tax on ordinary and preference shares	1,952	14 6
Trade & general charges	363	0	10		£38	2 7
Rent, rates, and taxes	86	6	7	Gas and meter rental	5,724	9 8
Directors and auditors	205	5	0	Products, profit on fittings, and sundries	1,418	15 9
Salaries and collectors commission	631	19	10			
Wages	373	2	8			
Interest on loans and debentures	290	1	0			
Loss on exchange	311	17	10			
Bad debts and allowances	47	5	0			
Retort account	50	0	0			
Meter renewal account	30	0	0			
Depreciation on works and plant, & expenses of first establishment written off	111	19	3			
Office furniture	5	0	0			
Balance—profit for appropriation	2,071	14	10			
	£7,181	8	0		£7,181	8 0

The Chairman: Gentlemen, in rising to move—"That the report and balance-sheet attached thereto be received, adopted, and entered on the minutes," I have very few remarks to make. I may say generally, that, as compared with the corresponding half of 1874, our working is very nearly the same. We have more capital, which has been laid out in extensions; we are worse as regards our loss on exchange, and we are worse also in our coke. These are the three prominent items of difference in our accounts; but taking the balance-sheet more in detail, I may say that we have an increase of £5380 in our capital, but we have an increase in our cash in hand of £3490. Our debenture bonds are £900 less, and sundry creditors £1907 less. On the credit side, the amount expended on works is £1600 more, and stock in hand £2570 less. As regards the profit and loss account, our coal carbonized is within £15 of the sum expended in the corresponding half of last year, but there has been an increase in the rental of £451. Our products, profits on fittings, and sundries are £240 less, and loss on exchange £180 more. We pay the same dividend as last year—viz., 7½ per cent., but we are only able to write off this half year at the rate of one-half per cent. per annum. With these remarks, and expressing my willingness to answer the questions of any shareholders who may desire further information, I move the adoption of the report.

Mr. Forman seconded the motion.

The Chairman, in answer to an inquiry from Mr. Rice, said: Up to the present time high prices for coal have prevailed in Australia, and freights have also been high. Freights are now lower, but the effect of the reduction will not be seen in the next or succeeding balance-sheets, but in the balance-sheet which follows.

A Shareholder: I see that the item of "stock in hand" now amounts to £8367; previously it has been as high as £10,000. Is it necessary to keep up so large a stock? If so, I think we should have a better return for the amount so

invested. Our dividends have only advanced one-half per cent. for the last five years, and I think we should have made more progress than that. I should like to know of what the stock consists.

The CHAIRMAN: I believe the shareholders generally are quite satisfied with the 7½ per cent. dividend we are paying. Of course, it would be desirable to pay more if we could, but still I do not know that any one can say 7½ per cent., fairly maintained, is not satisfactory. Nor do I agree with the last speaker that, because we have paid 7½ per cent. for six or seven times, therefore it is to be considered unsatisfactory if we do not make a further advance now. The stock consists of coal, coke, tar, gas in store, lime, oxide, &c. The quantity of coal is valued at £2431; coke, £168; lime and oxide, £102; tar, £11; gas in store, £33; fittings, £5620; making together, £8367.

The SHAREHOLDER: It is drawing it very close to take the gas in the holders; it is not usually taken.

The CHAIRMAN: It really makes but little difference whether you take it in stock or not, if you always do the one or the other.

The SHAREHOLDER: In my opinion, it does make a difference.

The CHAIRMAN: Then we will say that, in your opinion, to the extent of £33, we are overvalued. The coal in stock I do not think we shall be able to reduce. With uncertain freights, such as we have from Australia, and with an uncertain supply of coal, because we cannot go into the market at Singapore and buy as we do here, it would not be safe for us to keep less than nine or twelve months store. We have had a smaller quantity in hand, and we have had to pay through the nose to keep up the supply; therefore, it is not desirable to have too low a stock. In any English company with which I am connected, I do not consider myself safe on the 31st of December unless I can see 2½ months coal in hand—I mean on the works, knowing the vicissitudes there are sometimes to be gone through in the event of a prolonged frost. The other items of stock at Singapore are trifling, with the exception of the fittings. Certainly, £5620 is rather a large sum, and we have made efforts to reduce it. We are reducing it, but I do not see much probability of continuing it to a great extent. I think I told you we have reduced the stock during the last 12 months by £2574, but I should hardly like to say that we may not have to increase it again. If we had a cheap freight offered us, we might think it desirable to lay in a further stock of coal. I know one instance, in my foreign experience, in which, with my consent, a particular company, just before the coal famine, laid in a two years supply of coal, freights happening to be low; and, through that fortunate circumstance, the company were able to pass through the entire crisis without having to pay an increased cost for coal. Therefore, although large stocks may, on some occasions, be looked at with a jealous eye, on others they may be indicative of considerable economy to a company.

The motion was put, and carried unanimously.

The CHAIRMAN moved—"That a dividend be declared on the preference and ordinary shares at the rate of 7½ per cent. per annum, less income-tax in both case, or the amount paid up on the shares from the respective dates of payment to the 30th of June last, and that such dividends be payable on the 20th of November next."

Mr. FOREMAN seconded the motion, which was put and carried.

The CHAIRMAN moved a vote of thanks to Mr. Wells, the company's manager at Singapore, for the zeal and energy displayed by him in carrying on the business of the company. He said he had frequently proposed a similar vote to the shareholders, and he was bound to say that the longer he knew Mr. Wells, and the more closely he compared him with many other managers, the more he appreciated the great advantage the company had with such a representative at Singapore.

The motion was seconded by a SHAREHOLDER, and carried unanimously.

A cordial vote of thanks was also given to the directors, the local committee at Singapore, and to the secretary.

The CHAIRMAN, for the directors and local committee, and Mr. KING, for himself, having acknowledged these compliments, the proceedings terminated.

THE SUPPLY OF WATER BY PRIVATE COMPANIES.

In the Public Health Section of the Social Science Congress held at Brighton on the 11th ult.—Dr. RICHARDSON presiding—Mr. W. Rendle read a paper on the above-named subject.

Mr. RENDLE said that the principle of all trading companies was that of buying in the cheapest, and selling in the dearest market. This was the principle of all trade, and trade dealings in water formed no exception to the rule, as was shown by the practice of water companies, who had mapped out districts among them, and dealt only in water. Was water a fit subject for this kind of dealing? It was not. Air, which had not yet filtered through companies for profit, and water, were the first necessaries of life, for which no substitutes could be found. If the short-sighted policy of the rulers of former times placed water in the hands of traders, the time had come to make an end of the compact. The Secretary for India, who said that our ancestors might have been wiser in these arrangements, said also that the project of placing the supply of water in the hands of representatives of the people was Utopian. In that respect the Marquis understood neither the times nor the people; and it was perhaps well that the Home Secretary, who had some sympathy with them, and tried to understand them, was the Home Secretary. It was the practice of modern legislation to modify, or altogether annul, arrangements which, however good they might have been in other times and circumstances, were not only no longer for the public benefit, but, as in the case of the water supply by companies, a great inconvenience and injury to the public interests. What was the use of an elaborate and an expensive Government, if it did not keep pace with the times, and adopt discoveries which our forefathers never dreamt of for the benefit of the people? At least, this should be so in the case of the supply of the first necessaries of life. How otherwise could the penny post, telegraph, and many other benefits have been produced? Should water be exempt from the same rule, and be placed in the hands of people who thought not only of dividends, but of large dividends, the first idea being profit, and the second the supply of water of such a minimum quality and quantity as would not too much rouse people's indignation. These companies sometimes supplied water of such a character that the people who drank it died by hundreds and thousands, of cholera, fever, and like diseases, while others, close at hand, who were supplied from a better source, did not so die. There were numerous instances of that kind, and the facts were not disputed by any but the water companies and their partisans. It was established beyond doubt, that the supply of water under certain unwholesome, but quite avoidable conditions, was the great motive power in the causation of certain serious diseases. Tainted water supplied to thousands involved epidemics, and if from other causes, epidemics were about, such water intensified the disease. The actual cost of the supply of this first necessary of life should alone be the measure of the charge for it. Those only whose daily work it should be to attend to the supply of water should be paid, and, indeed, liberally paid. The overseeing should be the hands of the best men, who were always to be found willing to take such a position from honourable motives for the sake of the public good alone. The need of such a change was becoming daily more manifest, and it was not to be tolerated that in such a place as London a system of water companies should be continued, when so many most important towns had already, with great benefit to themselves, rescued their water supply from the trading companies. London, notwithstanding its size, its riches, and influence, was remarkably behind in that matter, and the causes were not far to seek. The vested interests woven throughout society, especially in London, the head-quarters of all schemes, were enormous; and as those vested interests were dead against the public good, and against any change in the direction indicated, their power was generally found sufficient to overawe every timid, time-serving Government, no matter of what party. The worst of it was that, under the name of vested interests, the public contained within itself its own deadliest enemy, the great water vested interest among the rest. He was no advocate for spoliation. The work done by the companies, under a different state of things, should be fairly recognized; no one desired to give them less than was their due. Still, while no injustice should be done to them, the public was not called upon to suffer injustice from them. A very serious injustice, however, was threatened. In 1869 an Act was passed for a periodical revaluation in London—a wise Act, no doubt, as the value of property rapidly changed in these times. The very essence of the Act was that every one should be fairly dealt by. It was not that we should pay more in each case, but that we should pay equally; it was not intended for private purposes, but for the public benefit only. It happened that those who framed the Water Companies Acts (they could not foresee the result) clumsily enacted that the charge for water might be in proportion to the rental value of the houses supplied, within certain limits. The companies had seized the opportunity of each revaluation to make, and still to sustain, a continuous increase of those charges. The parishes, in most cases, if not in all, allowed an off-set, say one-sixth, for the cost of keeping the premises repaired and insured; but the companies deducted no such amount, insisting upon the uttermost farthing. He had no public word that he could use which would adequately describe the process. The whole tenor of the Act clearly referred to public rates, and could scarcely be meant to apply to charges upon water. If so, it was nothing else than over-riding, for private purposes, an Act of Parliament intended for the public good. He thought that there should be a general subscription for funds to try the question, on a most undeniable and typical case, before a court of law that could rightly take cognizance of such a question, and then, if the case were lost, Parliament should be strongly urged to rectify the mistake. He had cases before him in which companies, supplying the same houses with the same quantity of water, had deliberately increased their charges—he objected to the term rates—10, 20, 30, and even 50 per cent. In one case, where the charge in 1869 was £3, it was abruptly increased to £5 10s. In another case, where th charge, 15 years ago, was £2 10s., and afterwards £3, it was abruptly increased to £5 10s. In another case where the charge was £2 2s. it was raised to £3 3s. In another case the charge was raised from £2 12s. to £3 15s. In these cases the conditions were the same as before, and the company were paying excellent dividends to their shareholders. The charges so raised were not raised proportionately, fairly, or equally, but rather upon such a basis as to try how much would be borne in each case. The effect of these charges might be shown in the case of the Lambeth Company, which he would take merely as a specimen, whose shares had risen from £102—£113 to £119—£133. The interest paid steadily increased—it was now 6½ per cent., which, for business of that kind, he thought was pretty well. Possibly they did not know all the profit that was made. Notwithstanding the Act of 1871, which provided for an audit of the accounts, he was not satisfied that the public knew enough of the particulars to enable them to come to a satisfactory conclusion. Before the Act was passed, the old advocates of the companies again and again used to complain of letting the public know the private affairs of the companies; and Mr. Bateman, the water engineer, stated in evidence that as to certain important items of account he could make nothing of them, and that he could get no information from the companies. The Act of 1871 provided for an auditor to be appointed by the Board of Trade. He should prefer a much better mode of appointment, say by the Metropolitan Board of Works, which was made up of representatives of the people. In these as in other important matters, it might be well, by a little discussion in the vestries, to ventilate the subject, and state their grievance. He would take the Lambeth and Southwark Companies as instances. Their legal profit was 10 per cent., and they intended to use the law to reassess or raise their price steadily, but quickly, until the limit was worked up to. He would ask whether business men generally would not be delighted to realize such a profit on such magnificent conditions? Their customers were many, and rapidly increasing. There were no competitors, no bad debts to speak of, and scarcely a person living in the district set apart for the company could do without the article they supplied. He believed that when the maximum profit was fixed upon, it was only intended to apply to extraordinary circumstances. It appeared to be certain that in future revaluations, the companies would continue to increase their already advancing charges. If people grumbled they were snubbed and threatened with a further rise. If a consumer did not like it, he was simply met with the taunt that the company did not wish to force their commodity upon him. He had had great difficulty in obtaining information from certain persons, lest he should publish the cases and bring the companies down upon them. Such petty terrorism, he thought, should be done away with. Some persons, it appears, made their own private arrangements with the companies, and it was notorious that the charges were unequal. The consumers of water should make common cause while there was yet time, before the companies increase their charges, so as to extract a ruinous compensation when they had to give up business. A uniform 10 per cent. would give an enormous and unjust compensation when it came to be capitalized. The people who legislated for the country were usually moneyed men of business; and, as in the case of the costly price they paid for the telegraphs, did not recollect that the multitude of the people were toilers with but little money to spare. The public should see to it themselves that no methods crept in for the purpose of raising future compensation beyond its real value. Let the public be fair to the companies, even if the companies were not fair to the public. No doubt the companies had been at times put to great expense to increase and improve their supplies, but then they looked to and received an increase of custom for their remuneration. What would be thought of a baker who, when enlarging his premises, in consequence of an increase of customers, should send round to tell them that the price of each loaf would in future be raised from 8d. to 9d.? This was what the water companies were doing. They had no competitors; they had been dividing the land between them, and they did not even fall out that the public might come by their own. They removed to larger premises, as every good man of business did when he desired to secure his prosperous and increasing trade. They were allowed to take the public water practically free and to take up the public streets, which they often did, in a very shameful and unnecessary manner. He had seen many wanton and barbarous acts of that kind; in fact, the surveyor in his own parish, to which he was office, of health, told him that the water company in the district used to look out for the opportunity when the roads were laid down, because they were then much easier to pick up. Every device was adopted to increase the income of the companies, so that when the time came to capitalize they might receive a larger amount of compensation, and everything which could be considered an extra was charged separately, some things being apparently charged twice over, and the companies appeared to have resolved that whoever would not take it quietly, should have it "hot"—not the water, but the charges. Let the public consider how the carelessness or the cupidity of the water companies brought disease among them. He wished to give a friendly warning, and he said let the companies beware. In Kent Street and Lant Street, in his own parish of St. George's, Southwark, the poorest people on Sundays during the hot weather were often supplied by friendly publicans and others with water, because of the insufficient supply of the company. When a complaint was made to the Lambeth Company, the curt answer was received that the company supply water on Sundays in such places as they deem necessary, and that the directors are satisfied that a Sunday supply is not wanted throughout the district. This was in a parish that contained 30,000 people, who lived in small lodgings, and amongst whom Sunday was really the day of washing. On another

occasion, the Southwark Company administered a similar snub, when it was pointed out that a piece of machinery was placed between the reservoir and a filthy part of the river, so that it was at least possible to admit a supply of impure water. It was distinctly proved that filthy, unfiltered water had been supplied by the company. No doubt things were better now than they were. Dr. Parker, however, the medical officer of health, wrote on the 14th of September that a chronic warfare had been going on for years between his vestry and the water company. The quantity of water, he said, was deficient, and was always so in summer. In some cases pending investigation, the complainants were, for a time, flooded with water upon the principle that "if you will have it, you shall have enough of it." The new workhouse at Rotherhithe could not be supplied at the needful height by the company occupying the ground; at the same time the Kent Company, which supplied other parts of the parish, could easily do it, but from the arrangements, they were not permitted. In the face of this possible supply from another company, the guardians would be obliged to have a deep well and machinery for pumping. Dr. Parker also stated that the quality was, on the day mentioned, so filthy, that no one would bathe in it, and to drink it was positively revolting. Fish, he said, came in, and if fish could come in, of course, there was room for other things not so nice as fish. The supply of water to 3½ millions of people—not far short of the population of all England in Elizabeth's time—was a matter of supreme importance. This was especially so in the case of fires on a large scale. Nothing less would suffice than a responsible public authority, with full power to act upon all points in danger—a power which, on an emergency, could command all resources, a power which might be made answerable that, humanly speaking, all had been done that could be done. One great incongruity had specially struck him—the great difference made by companies when water was treated as a luxury and as a necessary. He had been offered additional supplies for the purpose of luxury at much less per gallon than the supply required for drinking purposes. For household purposes he was charged 5s. per 1000 gallons; but for his garden and other like luxuries the company offered to supply him at 2s. per 1000, which might be reduced to 1s. 6d. or 1s. 3d., by taking a large quantity. There was, therefore, no scarcity of water; and it did not seem logical that the company should charge so much for so little, and so little for so much; nor did it seem right that the companies should charge so high for necessaries, and so much less for luxuries. The intermittent system of supply involved many evils. Amongst the poor there was a great need of receptacles which, in their case, were inferior, unclean, and often half rotten. Water had, when neglected, a most voracious appetite for taking hold of foul air and disease-producing organisms. He had known small ferrules let into the ground of very much smaller diameter than the pipe, so that people who did not understand the matter, wondered that they had so small a stream from so large a pipe. The pipes were also apt to become exhausted receivers, and to suck in gaseous and other unsavoury products near at hand. The intermittent plan really involved an enormous waste and loss to the company, and no gain to the recipients. It was estimated that 32 gallons of water on the average were supplied in London to each individual; but the poor of the parish in which he was medical officer of health did not receive more than four or five or six gallons per day, and the supply was of such a character, and in such receptacles, that the gin-shop proved to be a very attractive alternative. The intermittent system also involved a barbarous method of dealing with fires, which nothing but a constant supply and unity of management could remove; indeed, a constant supply had become to be everywhere recognized as inevitable before long. The best engineers fully believed in it, and many large towns had adopted it. Its advantage in regard to fires was well known. The Manchester people, who had a constant supply, stated that it was almost impossible to have a large and an extensively destructive fire with water in sufficient quantity and at sufficient pressure always at hand—which really meant water in full play upon the fire in two or three minutes. The late Mr. Braidwood bitterly complained of the insufficiency of water at fires. The provision of the Building Acts as to the height of party-walls was at present the principal safeguard as to the spread of fires in many places. Passing along the railway, and seeing the splendid warehouses huddled together, he was sometimes filled with dismay as to the possibility of a fire, with an unfavourable wind after a drought, if they were to have nothing better than the lumbering engines of the water companies, with their limited and adverse interests, and apparently the short-sighted but universal interest of supplying a minimum of water. Comparing the amount of property actually saved in that way with the amount not burned, but destroyed by water, he was in doubt whether such a fussy method saved much property after all. A constant supply would, of course, require power to compel the use of fittings of a most approved kind, and power to come down with a heavy hand upon careless and mischievous people—power to enter houses, with the view of detecting anything wrong. Was it likely, in such a country as ours, power like that would be given to provide trade companies? If not, there was no alternative but to place the water supply entirely in the hands of representatives selected for the purpose. The Acts of Parliament on the subject always appeared to be hampered with conditions unfavourable to the people. Some vestries reported that they were insufficient and attended with delay, and some appeared to be quite unworkable. Later Acts were so permeated with the permissive principle, that, however necessary and vital the provisions, they were only workable among willing people.

The PRESIDENT said he hoped there were some of the advocates of water companies present, who would state their views on the other side of the question. Probably, if they could have foreseen what would have been said with regard to the companies, they would have taken care to have an advocate present.

Dr. GILBERT CHILD said he would like to say one word on the opposite side. He felt, however, that he had his work pretty well cut out, seeing that Mr. Rendle's paper had, not unnaturally, produced a considerable impression upon those present. Like Mr. Rendle, he was an officer of health, not, however, in London, but in a country district, which was, perhaps, the reason for his taking a somewhat different view from that of Mr. Rendle. They had all heard for the last 20 years of the various defects of the water supply in London, and no doubt they had all, more or less, experienced the same thing. He supposed that there would be no difference of opinion as to the fact that considerable defects did exist in the water supply. These defects, however, were considerably less than they were, and the supply had improved marvellously during the last few years. He should be very well pleased to see many of the country towns and villages supplied half as well as the worst part of Brighton was supplied at the present moment. There was no comparison between the water supply of London and that of a vast number of small towns and villages in the Midland Counties of England. Any one who had gone into the question would know that that statement was true. Before finding fault with the water supply of London, and revolutionizing it entirely, they would do well to bear in mind that, after all said and done, it was one of the best, if not *the* best supply existing anywhere in England. Its gigantic size should not be overlooked. Mr. Rendle had, he thought, shown a little prejudice in some of his statements. He had spoken of water as equally a necessary of life with air, and said that one ought not to be a matter of trade any more than the other. No one doubted that water was as necessary to life as air; but air could be obtained without the use of pipes, whereas water could not. An expensive apparatus was required to obtain water, but the only apparatus needed to obtain a supply of air was that which we possessed in our own lungs. Then with regard to the proposition to place the supply of water in the hands of local authorities, it should be remembered that in England we were not particularly fond of being too much governed, and, in the main, we were a great trading community. The real question after all was one of economy. Could the thing be done better by taking it out of the hands of the private companies, and putting it into the hands of local boards and rural sanitary authorities? He was inclined to think that a man who was a director of a company, and who had a large stake in it, was more likely to see to the condition of the company, to see that it was brought into the best possible working state, than he would be as a member of a local board, to whom the whole thing did not matter a snap of the fingers. The great idea of most members of local boards was to keep down the rates. They had no idea of looking forward, and making preparations for the future. In the case of epidemic disease, their plan appeared to be not to look forward, even for a few years, but to live from hand to mouth, and do everything they could to keep down the rates for the next quarter. To raise a rate from 6d. to 9d. was looked upon as an unpardonable sin. That, as far as he knew, was almost the sole principle upon which local government boards acted. Mr. Rendle had alluded to the telegraphs, which might, perhaps, be taken as a good illustration. It was well known that, as long as the telegraphs were in the hands of private companies, they paid. Indeed, very few things paid better. In fact, they paid so well that the Government had to give an extravagant compensation when they took them over. As soon as they were in the hands of the Government, it appeared that, financially, they were a complete failure. Would not the same thing happen if water companies were placed in the hands of local boards? There appeared to be, in the present day, a desire to be over-governed. Whenever difficulties arose, it was suggested that Government ought to interfere and do for us what we could not do for ourselves. He did not think the local boards had worked as well as people expected, and it would not be wise to give them more power than they already possessed. Mr. Froude said that general knowledge meant particular ignorance, and he (Dr. Child) was disposed to think that local government was only another word for general anarchy. He believed that it was, in a great measure, a failure—at all events, it could only be said to be on its trial; and, before it received such an enormous power as that which it was proposed to give it, it ought to be further tested, so as to ascertain whether it was likely to carry out the supply of the necessaries of life, and the sanitary arrangements of the people, with that degree of perfection which certain persons seemed to anticipate.

Mr. CHADWICK said that the fact of a thing being done, and done well, on a public footing, was evidence that it was a possibility. A reference to what had been accomplished in Manchester, Liverpool, and other places, since the water supply had been put on a public footing, would show that an enormous saving had been effected. In Manchester and Liverpool at the present time there was a saving of one-half as compared with London. It should, however, be remembered that, unless there was a proper control of the house services, it would be impossible to prevent an enormous waste with a constant supply. If London were to have such a supply, power would be given to control the waste. At the present moment the waste in London was 110 million gallons a day, about as much as was pumped from the Thames. If there were a constant supply, the probability was that 16 or 17 gallons per house would suffice, instead of 33 gallons. Then if the matter were placed on a public footing, the requisite capital could be obtained on cheap terms, say, of 3½ per cent.; whereas in the case of a private company, it would be necessary to give 5 or 6 per cent., and a fair profit upon the capital would be looked for. At the present time the London water companies received about 7 per cent., and they contended that, considering all the trouble and difficulty, that was not too much. That might be conceded to them; but then they said that they had a right to what was promised and sanctioned by Parliament—namely, 10 per cent. It was brought out by the researches of the Society of Arts, that, by unity of management, a saving of from £100,000 to £150,000 might be effected, and that that saving capitalized might be applied to providing hydrants, and various means of cleansing. In Manchester, Liverpool, Glasgow, and other places, the effect of having hydrants close at hand was that the loss of property and life by fire was reduced by two-thirds. The water could be brought to bear upon a fire in about two minutes, within a period of safety, whereas by the present system of engines the average time required was 25 minutes. Mr. Braidwood used to state that the period of security for property or life was about five minutes. There were 200 or 300 serious fires in London every year, in which many persons were burned or injured. A great deal of this would be prevented if a constant system were adopted. The companies had promised again and again to put on a constant supply; but, in order to accomplish this satisfactorily, there must be a unity of management under some special public authority.

Mr. BALDWIN LATHAM said that the question should be looked at from another point of view. There was certainly something to be said in favour of the companies. Had it not been for the water companies, very many of the towns in England, the metropolis included, would not now have had the benefit of a good supply of water. It was a difficult thing to get the towns themselves to undertake a supply of water for all sanitary purposes. The ratepayers of the district were, as a rule, opposed to expenses which could in any way be avoided, and they would rather see a water company established than apply the local rates to such purposes. With regard to the prevention of waste, it was notorious that the works which were in the hands of private companies were the most efficient in regard to that matter. In Liverpool the waste was something enormous. The corporation was about to apply to Parliament for powers to introduce measures for the prevention of waste. It was necessary that they should call a town's meeting before they could take steps under the Borough Funds Act, in order to get the sanction of the ratepayers; and the result of the meeting was that the townspeople would not suffer the corporation to go to Parliament for the powers required. The water supply, therefore, would never be brought to that low point which was necessary if great waste was to be prevented. Seeing that companies actually possessed the power of preventing waste, there was, in their case, a great advantage, both in regard to saving money and in a sanitary point of view. The mains which were adapted to the prevention of waste were also the best for severing the connexion between the water supply and the sewers of the district. The question of an intermittent supply was not connected entirely with water companies, for there were some works in the management of corporations which had an intermittent supply. It should not be concluded that because some companies in London gave an intermittent supply, that mode of supply was natural to companies. It was, no doubt, most desirable that towns should have a constant supply, and also that the supply should be in the hands of a sanitary authority. A private company would look to profit before looking to sanitary questions; but a town would have no such consideration when once it was embarked in the undertaking. The difficulty was to get the people see to that it would be much better to have the supply in their own hands. It was necessary that there should be abundance of water to cleanse the sewers and extinguish the fires; but a water company had no direct interest in either of those operations; in fact, all the water used for such purposes was, as far as they were concerned, wasted and lost, unless they charged the ratepayers an enormous sum for it. Unfortunately, towns were now suffering under great disabilities with regard to the acquisition of water-works, which it would be well to take into consideration with a view to their removal. In order that a town acquiring water-works might be able to supply water to premises by compulsion, it was necessary that it should be supplied at a very low rate that would not be remunerative—say 2d. a week, or such other sum as the local board might determine; so that the town could not compel the owner of a single cottage to take water without first submitting the question to the Local Government Board. Such hindrances, he thought, should not be suffered to remain.

Mr. T. WALLER said he was much obliged to Mr. Rendle for bringing the subject before the department. He held in his hand a paper showing the prices which shares of the New River Company had realized at the Auction Mart. In

1823 one share was sold for £17,050; in 1858 a share was sold for £19,000; in 1870 a share realized £38,000; and in 1873 one was sold for £49,000. Ought such a monopoly as was indicated by those prices to be permitted? He wished also to call attention to the regulations as to fittings, &c., which the New River Company had recently attempted to enforce. It would have cost the metropolis nine millions sterling to have carried out the alterations required, and no one would have been benefited except a few tradesmen, who, he suspected, had assisted in drawing up the regulations. He was willing to put down £50 towards a fund for trying the question as between the New River Company and the consumers. His own house, which was formerly rated at £90, was advanced to £167. He wrote a letter on the subject to a newspaper, and in the following quarter his water-rate went up 55½ per cent. Gresham Club, which was formerly rated at £750, was now rated at £1500, and the water-rate was advanced from £27 to £42. Another institution, which was rated at £490, on going into new premises (where the same business was done and the same amount of water consumed) was rated at £2080; and they paid double the amount for the water, being liable, however, to pay £62.

Professor WANKLYN said that the proposition of Mr. Rendle to abolish water companies, and place the whole supply of the country (for that was what it amounted to) in the hands of Government, was an exceedingly grave one. Personally, he had nothing to be thankful to water companies for; one of them, indeed, had brought an action against him for libel; but he should be exceedingly sorry to see water companies abolished. He believed that they would supply the country with water better than if the supply were in the hands of the Government. The reasons for his thinking so would require a long time to state; but he believed if there had been no water companies in London—if the supply had been managed by the Government, matters would be far worse than at present, and there would be but little chance of improvement. The London water supply was at present one of the best in the world. It was true that there were some districts not very well supplied, but taking it altogether the supply was an excellent one. The defects that existed might be remedied, for laws could be passed dealing with the companies in a very stringent fashion. There was one Thames company (the Southwark and Vauxhall) which supplied water to the metropolis in the condition in which it was taken from the river. This was a great scandal, and should have been stopped years ago. The reason why it was not stopped was the unfortunate dispute among the chemists; but he did not think that 12 years would elapse before something was done to remedy that defect. Even the West Middlesex Company, that supplied water of as good quality as was supplied to Manchester or Glasgow, every now and then (not often) supplied water of an inferior quality. This was especially the case at the period of storms. He believed it would be possible by suitable legislation to compel the companies to do their duty. That would be much easier than to transfer the supply to the Government. When it was so transferred, the public would be powerless to improve it.

Mr. STOOR said that Professor Wanklyn was in error in supposing that any one proposed to transfer the whole supply of water to the Imperial Government. The proposal was to vest the power in the hands of local bodies governing certain specified areas; and he protested against any arguments counter to that proposal being drawn from defects of local government in the metropolis, or in any other part of the country. If such defects existed, as no doubt they did, the proper course was to remove them, so as to have the best possible local authorities in which to vest the water supply of their respective districts. He did not believe it possible by any legislation to put the water supply on a satisfactory footing. Water companies had everywhere driven coaches and six through Acts of Parliament and through local regulations, and he had ceased to rely upon any security of that sort. The great thing was to educate the ratepayers and show them the advantages of taking the supply into their own hands. It was no use to expect anything to be done through the medium of the present vestries. In one of the large London districts mentioned by Mr. Rendle, the chairman of the company supplying it was also the chairman of the vestry. Under such circumstances it was almost impossible to get a proper discussion on any matter between the company and the ratepayers.

Mr. CROSSKEY, High Constable of Lewes, said he was the director of a water company, and spent a good deal of his time in considering the best means of providing a complete and constant supply. He would suggest that, instead of abusing the water companies, and calling attention to their shortcomings, gentlemen should qualify themselves as directors, and do their best to increase the supply of water to the people. It must be many years before the question could be sufficiently ventilated for water-works to become the property of Town Councils and other local boards. In the meantime it was necessary that men of intelligence and scientific attainments should devote their time to the subject.

Dr. FARR said that, in his position, he had had a great deal to do with water companies, who had been good enough to attack him, the Registrar-General, and others, for pointing out defects in the water supply of London. At one time they pumped the sewage poured into the Thames directly into the houses of the people, and if that had been altered, it was very much owing to the labours of Mr. Chadwick and others, who had driven the companies up the river to obtain a supply which Professor Wanklyn now said was of fair quality. He quite agreed with Dr. Child and others that there were great defects in the local administration of the country. The local bodies were many of them excellent, and worked pretty well; but if they could be made more intelligent and stronger, they would never get into the hands of water companies. The New River Company was started by Myddelton, who was ruined by it. The City refused to take the water supply of London into its hands, and therefore the companies deserved to be taken into account. They had done good service, and ought to be recognized, for probably the work could not have been done in any other way. Many large cities had no municipal bodies, and they, therefore, sold themselves to the water companies. If such bodies were generally established, the right thing for them to do was to take the water, sewage, and gas into their own hands. Trading companies always worked with a view to profit, and would not sacrifice a dividend to what they considered imaginary advantages to the people. The main object should be to improve the general health and happiness. The time had come when water companies must be purchased, and there was some fear that they would endeavour to make the public pay about half as much again as they were worth. One reason why the telegraphs did not pay was that they were purchased at 20 years profits, though they were selling in the market at 13 years. The companies had so much influence in Parliament, especially in connexion with the railway companies, that they got the clauses inserted which laid that heavy burden upon the country. The danger was that the water companies might, at the present crisis, do the same. Any such attempt should be firmly resisted, and the companies should get the full value of their shares, and no more. The present discussion, he hoped, would lead the public to look into the question fairly.

Dr. CARPENTER, of Croydon, said that at one time he could have sided entirely with Mr. Rendle, and held up his hand in favour of the immediate transference of all water companies to local boards and municipal authorities; but a more intimate acquaintance with those bodies had not given him that confidence which Mr. Rendle appeared to feel. He began to think that the human nature existing in the minds of members of municipal corporations and local boards was very similar to that prevailing amongst directors of water companies; and that whilst it was the interest of the one to raise the dividend, it was the great object of the other to keep down the rates. While that feeling existed to such an extent as it did at the present time, he could not hold up his hand for the proposed transference. There was every reason to think that that must come to pass in the end, but he did not think that the time had yet arrived. There was, perhaps, quite as much jobbery among local authorities as among private companies; and until men of a higher stamp were returned to them by the ratepayers, no satisfactory result would be obtained. Were they satisfied with the way in which municipal affairs were at present conducted—with the way in which towns were sewered and roads repaired? The majority of towns were a disgrace to civilization; and, until the present system was remedied, nothing would be gained by the transfer of the water-works to municipal bodies. It would, however, be disgraceful for a town having no water-works to allow a company to step in, instead of putting the matter in the hands of the local authorities. The companies already established were no doubt entitled to some privileges, but they ought not to be allowed to go on increasing their dividends in the way they were doing. They had a monopoly, they were certain to make their money, and the dividends therefore should be limited to a reasonable amount. He also thought that persons suffering damage from impure water should have a right of action against those who supplied it, whether a local company or a municipal corporation. Under such arrangements there would be much less difficulty in dealing with companies, and, perhaps, the public might then defer to some future period the payment of the enormous compensation that would be required by shareholders in water companies.

Mr. LATIMER said the municipality to which he belonged (Plymouth) had had the water supply under their control for the last three centuries. An abundant supply was brought into the town by Sir Francis Drake from Dartmoor, a distance of 17 or 18 miles, and it had been managed to the great benefit of the town and district. Seeing the importance of a permanent supply, the attention of the municipality had of late been directed to that end, and they had formed reservoirs in order to receive any amount that might be required in times of drought. A profit was obtained of £3000 or £4000 a year; and the amount had been applied to the building of a new Guildhall, without coming upon the general rates. If good men were sent to represent the public at the various municipal and local boards, no doubt the same advantages would be obtained as had been realized at Plymouth.

Mr. TOWLE contended that local bodies were ill managed, and that a reform in their constitution was needed.

Mr. COLLINS said that as an architect he experienced great difficulty in consequence of the discouragement put in the way of a constant supply by the different companies, who were bound to carry out the provisions of the Act of Parliament. Not only were the requirements of the companies most onerous and difficult of fulfilment, but the cost was so great as to impose a heavy tax upon the occupiers. It was very difficult to know what a company really wanted; and they seemed hardly to know themselves. For that reason alone, if there were no other, a constant supply for London, necessary as it was, would be almost a dead letter. If the present system were allowed to continue, there ought to be as great an improvement in the mode of supplying water as the companies desired in their dividends.

Dr. STEPHENS said it was of the greatest importance that the various applications of water for extinguishing fires, flushing sewers, &c., should be in the hands of the governing body of a district. No profit should be made out of the supply of water; or if there was any small margin of profit, it should be devoted to the diminution of the rates, or increasing the purity or quantity of the water. Even with municipal bodies, however, there might be parsimony and mismanagement; and hence a central control was needed. The Local Government Board should have the power of saying, "You shall not go to an impure source because it is within easy reach; you shall consider health before all things, and shall do nothing to poison or injure your fellow-citizens; you shall put your hands in your pockets, and give a supply that shall be pure and abundant."

Mr. COOPER said he wished to call the attention of the department to an examination that he had recently made of the water at Oxford as an illustration of the way in which some companies supplied water to important towns. He found that the water, before it passed the filter-beds, was in a very dirty state, and after passing the filter-beds it was infinitely more foul than before. That perhaps might account for a great deal of the illness that had been prevalent in Oxford for some time. He had mentioned a subject at Glasgow that he thought ought to be again brought to the notice of the public—the fact of a medical officer being found to aid companies in supplying bad water to the district. That was a very reprehensible practice. When done once, it might be explained away or passed over; but when it became a systematic thing, the more it was exposed the better it would be for the health of the community. He referred to the case at Norwich, where some seven years ago the water was examined by Mr. Sutton, a public analyst, who found it to be very foul. He reported the circumstance to the municipality. The medical officer, whose name he would not mention, was then called in. He examined the water, and expressed his perfect satisfaction with its condition, and said that people might drink it with impunity. Much illness was caused at the time by the people partaking of the water. After the meeting of the Social Science Congress at Norwich in 1873, he (Mr. Cooper) went to several towns in the vicinity, Yarmouth, Lowestoft, and Cromer, obtained samples of the water and sent them to Professor Wanklyn to examine. The Yarmouth water, Professor Wanklyn determined to be very bad indeed. A great deal of illness was prevailing there, and the registrar of the district had called the attention of the local board to the many complaints that were made of bad water producing sickness. The same medical officer was called in to aid the Yarmouth Company, and he said he did not disagree with the analysis, but considered, notwithstanding that it showed a large amount of organic impurity, but that since it was of a vegetable nature it was harmless.

The PRESIDENT said that Mr. Cooper's observations were scarcely pertinent to the question under consideration.

Mr. COOPER said that the same medical officer had been called in to support the Oxford Water Company in supplying the bad water to which he had referred, and he thought that he was not out of order in merely mentioning that fact.

Mr. WILSON said that, when Parliament became a little more what it ought to be—a body charged with the welfare of the community, and less a collection of brewers, distillers, and shareholders of various kinds, attending to the protection of their own interests—they would, perhaps, begin to see that it was as wicked to hand over to private companies the supply of water as it would be to hand over to them the supply of the air one breathes. It was an illustration of the execrable way in which legislation was managed, that such a question had to be discussed. He spoke with some feeling, having lived for many years in a city that had passed through every stage of water supply, from a very unwholesome and imperfect mode of supply, to one that was very excellent, ample, and cheap. Coming from that city, Melbourne, where a mere handful of Englishmen had been able to accomplish all that was necessary in a few years, it was strange to come back to London and see the people contented with the old lumbering barbarous system of supplying a filthy fluid. A stream constantly flowing near the city was found to contain a pure and serviceable water, but then it was soon discovered, as the Londoners had found out centuries ago, that rivers so situated were likely to become contaminated by the various industries settling on their banks. The people of Melbourne, therefore, obtained a supply from a large lake about 28 miles from the city, borrowing money upon Government debentures for the purpose. The plan answered admirably; the water was good and abundant, and a considerable income was derived from the works, which went into the pockets of the community at large, being applied to the improvement of the streets and various forms of public undertakings. Melbourne was now as bountifully supplied with water as any city in the world. Besides having an ample supply all day and all night, they had enough to water the streets and extinguish fires with such alacrity that really it was no use for a fire to attempt to try to burn. In a very hazardous business in which he was

engaged, £15 a week was usually charged in the accounts for insurance; but, since the water supply of which he had spoken, the charge had been reduced to £2 a week, so that his firm saved £600 a year in that item alone, in consequence of the improved supply of water. The supply was in perfect order, and it yielded to the corporation from £70,000 to £80,000 a year.

Mr. RENDLE, in replying, said there was but very little for him to answer, no strong arguments having been brought forward in support of continuing the water supply in the hands of the companies. No answer had been given to the question as to whether London was likely to have unity of management in any great destructive fire or epidemic, or to the question whether the enormous powers necessary in the case of a constant supply would be likely to be put into the hands of private companies, for the purpose of enabling them to make domiciliary visits. With regard to the complaints of Dr. Carpenter, he had received two short notes from persons residing in his own town. One of them stated that the town was supplied at cost price, and not a cent of profit was allowed; no charge was made for closets or baths. The town was only a short distance from his (Mr. Rendle's) house, and he paid £9 for the same quantity of water as he could get for £2 5s. 9d. in Croydon. His other correspondent, who had been formerly Mayor of Croydon, said that the town had been supplied up to 1871 for many years by a private company, who thought of nothing but making as good dividends as they could for the shareholders. The company, however, broke down, and were obliged at last to put the matter into the hands of the municipality, under whom much better arrangements were made.

The PRESIDENT said that there were certain points on which they appeared to be generally agreed. The majority of the meeting appeared to be in favour of the transference of the power at present possessed by companies to properly constituted municipal authorities. It was also generally admitted that, in the beginning, companies did great and excellent service; they performed what other persons hesitated to perform; and that, in any arrangement for the transfer of the powers and works to a municipal body, they should receive the most perfect and fair treatment, but not that extravagant amount of compensation which was claimed, and which had been granted in other cases of a similar kind. They also appeared to have arrived at the conclusion that the water supply should be continuous and uniform throughout the kingdom, and further, that pure water was wanted in every part of the country. The supply to London did not appear to be worse than any other town. It was now a fair average supply, and a great deal better than that which existed in many country districts. There was a very general opinion that hydrants should be placed in the way described by Mr. Chadwick, so that water might be applied to fires in five minutes, instead of 25 minutes. He believed that those were the points upon which they were pretty unanimously agreed, and he hoped that they would be brought before the committee proposed to be appointed to take the subject into consideration.

The following resolution was then moved, seconded, and unanimously adopted—"That the council of the association be recommended to appoint a sub-committee to examine and take action on the subject of the supply of water being lodged in the hands of local authorities, in the interest of the public health and security of life, property, and public economy."

IRON AND COAL TRADES OF SHEFFIELD, SOUTH YORKSHIRE, AND NORTH DERBYSHIRE.

(FROM OUR OWN CORRESPONDENT.)

There have been but few sales of pig iron during the past week, although there had for a day or two previous been several transactions of that kind, of very fair proportions. The sales of foundry pig have been slower, notwithstanding an effort on the part of the producers to meet the wishes of possible buyers, by making slight concessions in prices. I hear of several lots of local foundry pig having changed hands within the past few days at from 61s. to 62s. 6d. per ton. The agents here of the North Yorkshire or Cleveland houses are now quoting the following figures for general maker's brands:—No. 1 foundry, 55s. to 56s.; No. 2 foundry, 52s. 6d. to 53s.; No. 3 foundry 50s. to 50s. 6d.; No. 4 foundry, 48s. 6d. to 49s 6d.; No. 4 forge, grey, 48s. 6d. to 49s.; No. 5 forge, mottled, 48s.; No. 6 forge white, 48s. 6d.; refined metal, 70s.; Kentledge, 57s. 6d.; and cinder pig 40s., all per ton on net cash terms. Some of the best kinds of hematite pig irons are 2s. to 2s 6d. per ton dearer, but the rise is not general, so far as I am able to ascertain. There have been a small number of transactions in merchant iron, chiefly in best and medium bars, but as a rule the merchants are complaining very bitterly of the dulness of trade.

The foundries are still doing a respectable amount of business in the production of such articles as have been frequently described in these notes during the past few months. Pipes seem to be in very good request for water supply purposes, at prices which are, I hear, rather under than over £6 per ton!

The brassfounders and manufacturers of special gas and water requisites are still fully engaged, and, judging from the state of their order-books are long likely to remain so. There is a particularly good demand for screw-down bib water-taps, which are now being generally prescribed by the regulations of the various leading water companies of the country.

There is an upward movement in household coal in connexion with the advent of November, but up to the time of writing I have heard of no corresponding advance in steam or gas coal; in fact, the supply is now so abundant that any serious rise is wholly improbable this winter.

IRON AND COAL TRADES OF SOUTH STAFFORDSHIRE AND EAST WORCESTERSHIRE.

(FROM OUR OWN CORRESPONDENT.)

The feature of the week in the coal trade of this district has been the concession of the demands of the miners for increased wages, followed by the declaration of an advance ranging from 1s. to 2s. per ton, according to quality, on household and manufacturing coal. This step was initiated by the Earl of Dudley's principal agent, and one or two of the leading Cannock Chase firms. Opinion is very divided amongst the general body of coalmasters as to the prudence of the course adopted, the trade being in anything but a satisfactory condition as to demand; but, as the advance in wages will naturally be claimed by the whole of the miners in the district, dissenting coalowners will have no alternative but to follow the example set them with regard to prices. The standard of quotations for manufacturing coal in the Dudley district is on the basis of 13s. per ton for furnace coal. In the Cannock Chase district all classes of coal have been advanced 1s. per ton, and slack 6d. The advanced rates will be charged on and after the 1st of November next. Around Wolverhampton no official advance has yet been declared, and prices continue very irregular.

In sympathy with the movement in the price of coal, selling prices for medium and common qualities, both of pig and finished iron, have been decidedly stronger, and though there has been no declared advance, orders are, in many cases, being refused for sheets, hoops, plates, angles, and nail-rods, except at an advance of 5s. to 7s. 6d. per ton on the rates ruling a fortnight ago. The demand continues sluggish, but stocks of iron are comparatively low, owing to the restricted make. The number of furnaces blowing in the South Staffordshire and East Worcestershire district is 70, out of 151 built; but one or two others will be put into operation in the course of a few weeks. On the other hand, it is announced that Messrs. Sparrow have decided to pull down their furnaces at Stow Heath, in consequence of the contiguous mines having been exhausted.

The ironfoundry and general hardware trades continue moderately active, but it is expected that the recent movement in the coal trade will have a depressing influence upon the district generally.

THE LANCASHIRE COAL AND IRON TRADES.

(FROM OUR OWN CORRESPONDENT.)

Trade in the Manchester market has shown a very considerable improvement during the past month in all branches, and there is a hardening tendency in prices, especially in house coal, for which there has been a very brisk inquiry, and the large colliery proprietors generally are getting very much in arrears with their orders, whilst there has been a very considerable decrease in stocks. Engine fuel has also improved, the reductions which were made at the commencement of the month having to a considerable extent kept out of this market the coalowners in other districts who were previously competing here at lower rates; and stocks in this description of fuel do not show any material increase, except, perhaps, in the commoner sorts of stock, of which there is now a large production.

In the outside districts a good steady business continues to be done, and prices are firm, with a decidedly upward tendency in some quarters. In the Little Hulton district an advance of 1s. per ton is being made this month in house coal, and a similar step is being taken at the West Lancashire collieries in the best classes of Wigan coals, which have already in some cases been commanding more money in consequence of the pressure of consumers for supplies. The lower classes of fuel used for manufacturing purposes, although firm, have not met with that increased demand to justify an advance in prices, and they remain practically the same as last month, the average pit prices in the Wigan district being now about as under:—Arley Mine coal, 13s. to 14s; Pemberton four-feet, 11s. to 12s.; common coal, 9s. to 9s. 6d. and 10s.; burgy, 6s. 9d. to 7s.; best slack, 6s., and ordinary ditto 4s. to 5s. per ton.

The shipping trade is dull, even for the season of the year, when very large export consignments are not usually made, and the coasting trade is flat, consequent upon the competition of other districts where lower prices are quoted. The increased local demand for the better classes of coal prevents, however, any pushing of these sorts for shipment.

The coke trade continues exceedingly dull, and supplies are very much in excess of the demand.

The iron market of this district continues in a very depressed condition. There are very few inquiries for any descriptions of iron, and although local makers adhere to late rates, sellers of other brands quote considerably lower prices. The nominal quotations for Middlesbrough iron delivered in this district are about 58s. 9d. for No. 3 foundry, 57s. 9d. for No. 4 foundry, and 56s. 9d. for No. 4 forge; but a couple of shillings under these figures would be readily accepted to receive orders. Manufactured iron continues very dull, and prices are easier. Local makes of bar iron are about £7 17s. 6d. per ton, but Middlesbrough bars can be bought for much less. Light rails are quoted at £7 10s. to £7 12s. 6d., and heavy ditto at 5s. to 10s. less.

The forges, except in the Warrington district, where manufacturers of sheets are tolerably well employed, continue slack; founders still complain that they are working off old contracts without receiving much new business, and engineers continue to discharge hands.

THE COAL AND GENERAL TRADE OF THE NORTH OF ENGLAND.

(FROM OUR OWN CORRESPONDENT.)

Down to Saturday the coal ports continued to be blocked with laden vessels. The Tyne Dock and Shields Harbour were quite crowded out, and there were poor prospects of good sea tides. Nearly all the coal carrying has been done by steamers during the past fortnight; and on account of the lengthened detention of small coasting sailing vessels, coal freights to the British Channel have gone up nearly 1s. per keel, and rates to London and the Continent by sailing vessels show an advance. There is a plentiful supply of steamers, and until the large fleet of laden sailing vessels now detained have got to their port of discharge and return, the owners of steamers will have a good deal of the coal carrying in their hands. A large number of laden steamers sailed last week, and a good few more are loading up. London and the larger ports will probably be fully supplied by them; but consumers of coals in the several larger ports will possibly have some difficulty in maintaining their supplies of coal until there is a change of weather. The south-east gales seem to be very persistent.

The coal trade is much deranged through the circumstances narrated above. Of course if coals cannot be got away, the pits cannot work; and, notwithstanding that there are a number of orders in the market, the household and gas collieries have been a little slack, and prices are not so firm. Second-class pits in almost every branch of the coal trade are doing badly. There is a considerable difficulty experienced in quoting prices, for a determined push is made by the colliery offices to secure the business that is going, and they are, therefore, very irregular. The steam coal trade of the North of England is very much depressed, though on the south side of the Tyne, where the bulk of the house coals and gas coals are shipped, the docks are completely crowded out, and no more are allowed to be taken in except by special order. The shipping places on the north side of the water are comparatively bare of tonnage. There is a tolerably good average of shipments of coke from the Tyne for Spain.

The pig-iron trade of the North of England does not show that tendency to improvement in prices which is apparent in some of the other districts in England, but in the manufactured iron trade there seems to be an impression that prices have got as low as they well can. Under these circumstances, orders for iron shipping, and some other of the larger class of ironwork, have been placed in that market, and the tone of this trade is not quite so depressed and melancholy as it was a fortnight ago. It is clear, on the Tyne, at any rate, that some of the trades are showing more activity than they did in the early part of last month, though, anyway, business is bad enough.

The general manufacturing trade of the Tyne and district was a shade better last week. There were very good shipments of chemicals and fire-clay goods to London and the Continent; but that may have arisen from the detention of vessels on previous voyages, having occasioned an accumulation of goods for shipment at the wharves at this end.

There are large numbers of workmen out of employment in the North, more so than have been noticed for several years. Notwithstanding this circumstance, there are two or three partial strikes going on, and the men employed at the Washington Chemical Works have been out three weeks for an advance of wages, though it is a matter of notoriety that chemicals sold at the prices they are quoted at in the market will scarcely remunerate the manufacturers. Indeed, upon some articles of large sale in prosperous times they are "making a loss."

TRADE NOTES FROM SCOTLAND.

(FROM OUR OWN CORRESPONDENT.)

On the evening of Monday, the 25th ult., the annual meeting of the Kilbarchan Gas Company was held. The chairman and secretary explained that so far as they could make out, the company had gone behind only £91 during the past year, although the balance at the bank had been reduced from £194 0s. 11d. to £51 18s. 5d. They expected, however, that there would be a saving of £180 on the coal contracts for the current year, and this would enable them to reduce the price of gas, and have a surplus over. It was pointed out by Mr. Shaw that, notwithstanding the high price of gas, the company were rapidly falling behind, the excess of the expenditure over income during the past year, as appeared from the balance-sheet, being £135 9s. 5d. He moved that the directors be instructed to create a reserve-fund at the rate of 2 per cent. per annum on the capital stock of £1800. The motion was

seconded, and after some discussion agreed to unanimously. The motion for the adoption of the balance-sheet was ultimately adopted.

The Corporation Gas Commissioners of Aberdeen, at a meeting held last Wednesday, resolved to reduce the price of gas from 5s. to 4s. 10d. per 1000 cubic feet, from and after the beginning of November, the discounts being fixed at 4d. per 1000 cubic feet to consumers of one million cubic feet and upwards; 3d. per 1000 cubic feet to those consuming between 100,000 and one million cubic feet; and 2d. per 1000 cubic feet to those consuming between 65,000 and 100,000 cubic feet. It was stated by the convener of the Gas Committee, Bailie Esslemont, that although they were farther distant from the coal-fields than Dundee, they had been enabled to supply the gas, when coal was high in price, 5d. per 1000 cubic feet cheaper than the price in that town. The estimated revenue for next year was set down at £45,466, and the expenditure at £44,939, leaving an estimated surplus of £527.

On Saturday, the 23rd ult, a special meeting of the Gas Commissioners of Broughty Ferry was held, for the purpose of considering the propriety of transferring the gas supply of the town to the Dundee Gas Commissioners, as was proposed some time ago. Bailie Maclaren, the chief magistrate of the burgh, presided. Complaints were made of the manner in which the town was supplied with water by the Town Council of Dundee, acting as Water Commissioners, and the opinion was expressed that if the gas supply was no better the Broughty Ferry Commissioners had far better keep it in their own hands. It was also remarked that although the price of gas in the Ferry was 10d. per 1000 cubic feet higher than it was in Dundee, still the quality of the gas was much better, and it was ultimately resolved that no further steps in regard to the proposed transference of the gas supply should be taken in the meantime.

The Town Council of Glasgow, acting as the Corporation Water Commissioners, met on Thursday, when the actings of the Water Committee were brought under review. After the minutes of the committee had been read, several members complained that in the higher districts of the city, particularly Garngad Hill and Springburn, the water supply was occasionally defective, and suggested that in these circumstances the committee ought to be careful not to extend the supply to districts beyond the limits of the present area of distribution, Mr. Mathieson moved—"That the Water Committee in future make no change in the domestic water-rate, either by reduction or addition, without the instruction of the commissioners." After a good deal of discussion on the subject, Mr. Mathieson agreed to postpone his motion till next meeting, so that the town-clerk might be able to arrive at a decision in regard to the powers conferred by the Water Act upon the Water Committee as distinct from the commissioners.

At a special meeting of the Grangemouth Burgh Commissioners held last Tuesday, the total estimate for the new water-works was submitted by the engineers, Messrs. Bell and Miller, Glasgow. It amounted to £9590, with £410 for extras, to meet which it was resolved to borrow £10,000. The final decision will be made on the 13th of December, after the statutory lapse of six weeks after publication of the proposal to borrow.

The Greenock Water Trustees, at their last meeting, had under consideration the interlocutor by Mr. Forman, C.E., Glasgow, in the Gryfe Tunnel arbitration, finding Mr. Walter King, contractor, entitled to £1609, in full of all his claims against the trust, and the trustees acquiesced in the award. At the same meeting the superintendent reported that the supply of water in store was 413 million gallons, or 118 days supply, and that the consumption during the fortnight ending Oct. 9 had been taken at the rate of 61 gallons per head per day, taking the population at 68,000. The rainfall had been, for the week ending Oct. 2, 2·77 inches, and for the week ending Oct. 9, 3·06 inches.

Mr. H. R. Robson, president of the Institution of Engineers and Shipbuilders in Scotland, opened the nineteenth session of that society last Tuesday evening, by delivering the introductory address. It was very comprehensive and instructive, and, among other things, it dealt largely with the subject of water supply in Scotland, on which much fresh and valuable information was communicated to the members, amongst whom there were many of the leading members of the engineering profession.

Several changes have been made during the past week in the prices of makers iron, but warrants have undergone very little change.

The shipping demand for coal has fallen off a good deal, but a fair inquiry for house coal continues. The output for all kinds continues very large. Prices are practically unchanged.

Castle Donnington Gas Company.—The meeting of shareholders was held on the 20th ult. The report stated that £1200 had been expended during the past two years in reconstructing the works generally and relaying the mains in the town, and that to complete the alterations about £300 more would be required. It was, therefore, deemed prudent not to declare a dividend for the past year. The accounts showed that during the year an extra £100 worth of gas had been made at saving of £100 in coal and lime. The price of gas had been reduced, and the directors were in treaty with owners of property in neighbouring villages to supply them with gas. The retiring directors were re-elected, and Messrs. Eyre, Wilson, and Johnson were elected directors to supply vacancies. The receipts for the year ending July last were £977 1s. 0¾d., and the expenditure, £688 8s. 1¾d., leaving a balance in hand of £288 12s. 11d.

Transfer of the Longton Gas-Works to the Corporation. — The Town Council of Longton having applied to the Local Government Board for authority to borrow £75,000 to pay for the gas-works, which they have agreed to purchase from the Longton Gas Company, Colonel Ponsonby Cox, R.E., attended at the Court House, on Wednesday, the 27th ult., for the purpose of holding an inquiry. The inspector was received by the mayor (Mr. Edwards), the town-clerk (Mr. Hawley), and several members of the council, on whose behalf the town-clerk laid before Colonel Cox particulars. The Longton Gas Company was formed in 1859, under the Joint-Stock Companies Act, and in 1866 obtained its first Act of Parliament. In 1869 the company paid the full dividend of 10 per cent. on the original shares and 7 per cent. on the additional capital granted by their Act. The dividends in the following years (1870-75) were these:—10-7, 13-7, 14-8, 13-7½, 10-7, 10-7 per cent. The amounts paid beyond 10 per cent. were on account of deficient dividends in past years. In addition to these dividends, the company had written off their depreciation account since 1866 the total sum of £4087. When they obtained their Act, they purchased the mains, goodwill, and interest of the Stoke Gas Company, which had had the monopoly of supply, at a valuation of something like £11,700, of which sum £1300 had been paid out of revenue and the rest out of capital. The average gross dividend for the last seven years on the original shares was £11 5s. 8½d., and on the 7 per cent. shares £7 4s. 3½d. The dividends paid at these rates showed actual earnings by the company paid to the shareholders £3339 per annum. That, at 18½ years purchase, would amount to £61,776. They had a purchase at the rate of 15 5-23 years earnings, and on that calculation the terms of the purchase were unparalleled in the history of the purchase of gas-works. The rate was very, very rarely less than 20 years, and often more. Even taking the dividend alone, it was less than 19 years. Colonel Cox said no doubt the terms of the purchase were very favourable. Mr. Hawley went on to say that the interest on £61,000 at 5 per cent. would be £3050 per annum. He did not apprehend that there would be any charge whatever upon the rates in consequence of the purchase of the gas-works. A statement as to the state of the gas-works was put in by the manager (Mr. Darwin), who said the whole of the plant was comparatively new, with the exception of one gasholder, and all was in good order. In reply to the inspector, Mr. Hawley said the rateable value of the borough was £43,003, and the present indebtedness of the borough under the Sanitary Acts amounted to £27,000.—Colonel Cox said this was the first application under the Local Government Act for power to borrow for the purchase of gas-works. Mr. Hawley asked that the council should be empowered to extend the repayment over 50 years. There was no opposition to the proposal of the corporation, and Colonel Cox will report the result of his inquiry to the Local Government Board.

Register of New Patents.

4215.—Ireland, J., Manchester, "*Improvements in the distillation of carbonaceous materials and the production of charcoal and coke, and in apparatus for that purpose.*" Patent dated Dec. 8, 1874.

In the specification of a patent granted to John Imray on the 14th of June, 1872, No. 1795, a communication from T. S. Blair, was described a retort or apparatus for the reduction of oxide ores of iron. This invention relates to a mode of applying apparatus of this kind to the distillation of carbonaceous materials and the production of charcoal from wood, peat, and other vegetable substances, or of coke from coal and other bituminous substances, and to the necessary modifications of the apparatus for that purpose.

The apparatus described, in the patent referred to, consisted of a vertical retort into which the material to be treated was fed at the top by a tube or passage of small diameter, becoming heated as it passed into the upper part of the retort, where it was further heated by flame applied externally to the walls of the retort. The lower part of the retort was kept cool by water jacketing or otherwise, and the feeding passage at the top and discharge passage at the bottom were so arranged as to make the material operated on serve as a packing to exclude air from the interior of the retort. In applying apparatus of this kind to distil carbonaceous matter or to produce charcoal or coke, the upper part of the retort is closed, and a pipe is led therefrom to a gasholder or other receptacle, so that the inflammable gases resulting from the distillation of the carbonaceous matter can be collected and used for heating and illuminating purposes, and the oleaginous vapours can be separated by condensation so as to produce oils. The gases so collected may be used as fuel for heating the retorts themselves. In the lower or cooling zone of each retort there is also provided a pipe, by which means a jet of steam can be, from time to time, introduced into the interior, in order to extinguish fire in the descending mass of materials operated on. At the top of each retort feeding hoppers, provided with duplicate flaps or slides, are so arranged that the material to be operated on can be fed into the retort from time to time without allowing the gases or vapours to escape therefrom, or access of air thereto.

4227.—Sugg, W. T., Vincent Street, Westminster, "*Improvements in gas-burners, parts of which are applicable to other gas-fittings, and in the method of constructing and manufacturing the same.*" Patent dated Dec. 9, 1874.

This invention consists of several improvements, in all of which the principal object is the general improvement of Argand and other gas-burners with a view to the better development of the illuminating power in gas. Parts of the same improvements are, however, applicable to other gas-fittings.

The invention is based upon one for which letters patent, No. 831, dated March 18, 1869, were granted to the present inventor. In the latter the object sought was the delivery of the gas at the point of ignition at a low velocity, an exceedingly low pressure, and at a temperature as little above the surrounding atmosphere as possible. The low pressure at the point of ignition was produced by an adjustment whereby the tubes, conduits, or channels were less in area than the aggregate area of the holes through which the gas escaped to be consumed.

The first part of the present invention relates to the peculiar formation of these holes, whereby the pressure is still further reduced, and this is done by forming the steatite chamber without holes in the first instance, and subsequently making radial cuts across the top of the burner with a revolving cutter of such a size as to produce very large holes of a suitable shape, and so ensure the delivery of the gas in a more advantageous form for combustion. In some cases it is preferred to make the steatite or glass top with its holes at the bottom, and so as to leave between the holes and the top of the burner an annular hollow space, which is either parallel or truncated in section.

The second part of the invention relates to the making in glass, or part glass and part steatite, that portion of an Argand burner usually made of steatite, round, oval, or other shaped holes being made therein. It is, however, preferred that the holes should be made across the top of the burner in the manner described in the previous paragraph. The top of the burner may be also made of two cylinders of glass, platinum wire or plate being inserted in the top to maintain the cylinders in their proper relative positions, and to form the divisions or holes therein.

Another way of constructing an Argand burner is to insert two cylinders of glass in a metallic ring cast with a projection on its bottom of such width as to keep the two cylinders apart and at a proper distance from each other, the holes for the passage of the gas being made in the metallic ring; or the whole of the burner-top may be moulded and blown in such a way as the dispense with the metallic ring.

A part of this invention is also the making of bat's-wing burners of porcelain, or by blowing and moulding them in glass, and afterwards cutting the slit with a revolving cutter, as before described, care being taken that the cutter shall be of such size as to produce the proper width, depth, and form of slit. The invention also consists in cutting the slits in steatite burners with revolving cutters, so that the bottom of the slit shall be curved.

The third part of the invention relates to the use of an Argand burner with a solid or hollow peg or plug which enters the central aperture, thereby restricting the passage and directing the current of air to the inner part of the flame, the lower part of which is attached to a regulating screw, as hereinafter described.

The fourth part of the invention has reference to the construction of a cage of perforated metal which is made to surround the lower part of an Argand burner, and is provided with an external perforated sheath, which on being partially turned round, or caused to slide up and down, will regulate the quantity of air admitted to the flame and prevent a prejudicial effect upon it caused by any forcible current or disturbance of the surrounding atmosphere.

The fifth part of the invention consists in regulating the size of the channels, and consequently the quantity of gas admitted to the steatite chamber, by means of a screw with a conical, or preferably curved point, working through a stuffing-box and against a seat formed in the inlet-chamber or nose-piece. The screw may be made applicable as a stop-cock to gas-fittings in general.

A modification of the foregoing consists in forming the inlet-chamber with a stuffing-box, so that when the burner is turned round upon the ordinary nose-piece the gas way may be partly or entirely closed.

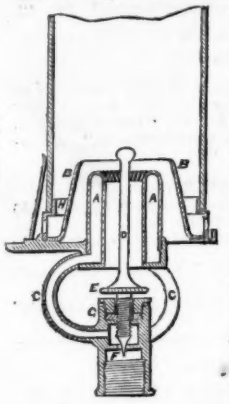
Another arrangement for adjusting the size of the conduits consists in making a thread in the inlet, and fitting therein a plug with a corresponding thread, this plug being operated upon by a spindle passing through the top of the inlet-chamber (which has a stuffing-box) by a milled head or similar device. Attached to the milled head is a peg which passes into the central aperture of the burner, and the plug in the inlet chamber has one, two, or more holes made through it. Upon turning the milled head, the plug will be raised or lowered so as to increase or diminish the size of the gas ways, while the peg will be also raised or lowered in the central aperture, thus regulating both the supply of air and gas by the same operation.

Another way of adjusting the size of the gas ways, in proportion to the orifices at the point of ignition, is by the insertion of a bat's-wing or flat-flame burner,

nib, or a plug having a suitably shaped orifice therein, in the nose-piece or in the inlet-chamber of the burner.

The sixth part of the invention consists in perforating the gallery as described.

The seventh part of the invention consists in casting the various parts in metal moulds, either separately, or, wherever practicable, in combination with each other.



The drawing is a sectional elevation of a burner, in which A is the steatite top with its radially cut holes; B is the cone, C, C, the delivery-tubes; and D is a peg or plug, either hollow or solid. It will be seen that the lower part of the peg terminates in a screw and curved point, and is capable of being turned by the milled shoulder, E; the result of such turning being either to open or close the gas way in the nose-piece, F, the screw working through a stuffing-box, G; H is a gallery glass or chimney holder, which is perforated so as to allow of a current of air to enter horizontally, and then to pass upwards.

The burner is sometimes provided with a perforated screen or cage covered with a moveable sheath. The apertures in these correspond with each other when wide open but are capable of being contracted by sliding the outer sheath partially round the inner one by a knob. By this arrangement the entry of the air, whether it be to the central tube between the burner and cone or between the cone and chimney, is capable of being regulated with great nicety.

4228.—Muller, J. A., Amsterdam, "*Improvements in apparatus for measuring water and other liquids, applicable also as a current meter and motor.*" Patent dated Dec. 9, 1874.

According to these improvements the supply-pipe is connected with a vessel in which is a spindle free to rotate on its points, and on the spindle are radial arms and floats and two horse-shoe magnets. An annular space is provided around the vessel connected with the supply-pipe, and the water enters the centre chamber through cuts or holes over which are tongues or screens so placed that a rotary or circular motion is given to the water. The vessel has a cap or cover, and vertically above the inner spindle is a second spindle, upon which is mounted a needle. The floats carry round the magnets which hold or bind the needle and carry round the second spindle to which worm gear is attached.

4234.—Foster, E., Halifax, "*Improvements in taps and valves.*" Patent dated Dec. 9, 1874.

This invention, which relates more especially to valves used for controlling the flow or escape of steam at high pressure, but is also applicable to taps and valves for other purposes, consists in constructing the valves of copper, cast in one piece, and also in constructing the seating with a convex rim on the raised portion thereof, instead of having a flat surface as heretofore.

4239.—Weston, J. H., Lansdowne Road, Surrey, "*Improved apparatus to be connected with open gas-burners for supporting half globes or reflectors, and for increasing the reflective property of the frame.*" Provisional protection only obtained. Dated Dec. 9, 1874.

This invention consists of an upright or standard to which a socket piece is attached, having a hook or lip, and also two projecting prongs which terminate in hooks or lips, upon which the upper half globe or reflector can be hung, the lips taking under the shoulder of the central aperture in the reflector in a free manner to permit of the reflector or shade expanding and contracting without the lips exerting any influence upon it.

4247.—Morrell, J. C., Leyland, near Preston, "*Improvements in the construction of sewer-pipes, drain-pipes, and modes of treating sewage.*" Patent dated Dec. 10, 1874.

The object of this invention is to facilitate, and to secure advantages which will promote the adoption of a double system of sewers in the drainage of towns, and which will further reduce to the minimum the difficulties of dealing with sewage waters, and consists in constructing a special form of pipes having two compartments for the liquids to flow through, connected by tubes or shafts. Ventilating shafts are fixed to same; and special means provided for more effectually gathering the subsoil drainage water. The cleansing of sewage water by special arrangements for intermittent filtration through natural soil is also included in the invention.

4262.—Perrett, E., Westminster, "*Improvements in filters, and in the method of cleaning the same.*" Patent dated Dec. 10, 1874.

In these improvements a cylinder or circular basket of wire or perforated metal work, similar to that used in ordinary centrifugal machines for curing sugar, is employed, and within it or against the inside is placed the suitable filtering material, which is returned upwards from the bottom to a ring capable of sliding on a central spindle, thus forming a sort of annular bag between the disc and case of the cylinder.

4271.—Murdoch, H. H., Staple Inn, London, "*Improvements in screw taps.*" A communication. Patent dated Dec. 11, 1874.

In constructing screw taps according to this invention, the threaded or screwed part is made of circular or nearly circular section at one end, and gradually assumes in section a curvilinear triangular shape or that of another curvilinear polygon. Longitudinal grooves are made in the taps to form the cutting edges and for the escape of the cuttings produced in forming the screw threads when the taps are in use.

4290.—Verdier, C., Paris, "*An improved water-meter and feeder apparatus for boilers.*" A communication. Patent dated Dec. 12, 1874.

The object of this invention is the automatic feeding at a constant level of steam-boilers by means of an apparatus measuring exactly the volume of water supplied; it is composed of a receiver in two parts, within which a float, pierced with a central hole and closed by a pipe, moves. The opening permits the float to move up and down a vertical rod, jointed at one end to a lever which actuates a little cylindrical slide. This slide distributes the steam in a cylinder, within which a piston moves commanding the distribution cocks by the intermediation of two levers. The steam enters the cylindrical box of this slide through a pipe which branches from the steam-pipe of the apparatus; it escapes from the cylinder through an orifice and a pipe fixed upon the escape-pipe of the apparatus. When the float is at the top of its course it strikes against a little tappet, and lifts the lever which actuates the slide; the steam which had previously served to actuate the piston finds a free escape at the same time that the introduction orifice communicates with the other side of the piston; the piston therefore descends to the bottom of its course, drawing with it the two levers of the two cocks. The key of these cocks changes the position of the orifices, and one pair of orifices of the two cocks will close at the same time as the other pair will open. The apparatus is thus cut off from the boiler, and in communication with the reservoir through two pipes, it will fill with water until the moment when the float becoming immerged at the top of its course will, as has been already described, actuate the slide and return the mechanism into the first position.

APPLICATIONS FOR LETTERS PATENT.

3671.—Foster, B. H., Newcastle-on-Tyne, "Improvements in filters." Oct. 22, 1875.

3680.—Aitchison, A., Manchester, and Whyte, J., "Improvements in the manufacture of gas for illuminating, heating, and cooking purposes, and in apparatus employed therein." Oct. 23, 1875.

3703.—Rawson, C., Victoria Chambers, and Slater, J. W., Tamworth Terrace, London, "Improvements in the treatment or purification of sewage and other matters, and in the treatment or preparation of agents to be used in the said purification." Oct. 25, 1875.

3704.—Cleland, W., Linacre, Lancs, "Improvements in apparatus used in the manufacture of gas made from coal, cannel, shale, and like materials." Oct. 26, 1875.

3739.—Clark, A. M., Chancery Lane, London, "Improvements in the ventilation and water supply of buildings and apartments." A communication. Oct. 28, 1875.

3747.—Field, R., Cannon Row, Londop, "Improvements in syphons for effecting intermittent discharge of liquid from sewage tanks and other vessels." Oct. 28, 1875.

3749.—Timme, H. F. O., Basinghall Street, London, "Improvements in mechanism or apparatus for raising and lowering chandeliers and other similarly suspended objects or bodies." A communication. Oct. 28, 1875.

GRANTS OF PROVISIONAL PROTECTION.

3237.—Adams, J., Hamilton, Lanark, "Improvements in charging vessels or receivers with condensed or liquefied gas, in liberating the same therefrom, and in the means or apparatus employed therefor." Sept. 16, 1875.

3394.—Phillips, W. H., Nunhead, Surrey, "Improvements in taps and valves, and in apparatus connected therewith." Sept. 29, 1875.

3398.—Walker, W. T., Highgate, London, "An improved gas-testing cock." A communication. Sept. 30, 1875.

3430.—Harlow, R., Heaton Norris, Stockport, "Improvements in valves." A communication. Oct. 2, 1875.

3440.—Jewitt, H., Kentish Town, London, "Improvements in Argand gas-burners." A communication. Oct. 4, 1875.

3446.—Crohn, F. W., Greenwich, and Okes, J. C. R., Maida Vale, London, "Improvements in combined engines and pumps." Oct. 4, 1875.

3477.—Arrowsmith, J. J., and Ferguson, H., Liverpool, "Improvements in plugs or stoppers for tubes." Oct. 7, 1875.

3490.—Lakin, J. P., Birmingham, "An improved dry slide for gas-fittings." Oct. 8, 1875.

3526.—Clark, A. M., Chancery Lane, London, "Improved automatic gas lighting and extinguishing apparatus." A communication. Oct. 11, 1875.

3539.—Leonard, W. A., Holborn Viaduct, London, "Improvements in continuous ignition fuses and in the friction match composition employed therewith, which composition is applicable to friction matches generally; also in apparatus or means for propelling and igniting the said fuses, applicable to the lighting of lamps and gas-burners of all kinds, cigar lighters, torches, and other purposes of ignition." Oct. 12, 1875.

3541.—Melvin, T., Glasgow, "Improvements in engines to be driven by steam, water, or other fluid, or for pumping." Oct. 12, 1875.

3542.—Newton, H. R., Seymour Street, London, "A locking apparatus for regulating a constant measured small or large supply of filtered or unfiltered water, to be delivered into existing cisterns or other reservoirs, or by a new system into closed tanks." Oct. 12, 1875.

3564.—Durham, W., Currie, Midlothian, N.B., "Improvements in purifying water." Oct. 14, 1875.

3605.—Floyd, J. N., Handsworth, Stafford, "Improvements in direct-acting steam-pumps." Oct. 16, 1875.

3615.—Abel, C. D., Southampton Buildings, London, "Improvements in engines worked by gas and air, and in their application for raising or forcing liquids." A communication. Oct. 18, 1875.

NOTICES TO PROCEED.

2131.—Maxwell, N. M., Queen Victoria Street, London, "Improvements in the construction of taps or cocks." June 10, 1875.

2183.—Johnson, J. H., Lincoln's Inn Fields, London, "Improvements in wrenches or spanners." A communication. June 14, 1875.

2312.—Cleland, W., Linacre, Lancs, "Improvements in jet apparatus for giving motion to fluids." June 24, 1875.

3013.—Hornsby, W. H., Portland Place, London, "An improved compound material for packing for valves." Aug. 27, 1875.

3046.—Silber, A. M., Cheapside, London, "Improvements in lamps." Aug. 31, 1875.

3157.—Grave, J., Manchester, "Certain improvements in water-closets." Sept. 8, 1875.

3188.—Shanks, A. F., Barrhead, Renfrew, "Improvements in and connected with water-closets, urinals, cisterns, baths, valves, and other apparatus in which water is consumed, contained, conveyed, or controlled." Sept. 11, 1875.

3220.—Whitaker, J. W., Wakefield, "Improvements in apparatus for charging gas-retorts." Sept. 15, 1875.

3221.—Crossley, F. W. and W. J., Manchester, "Improvements in gas motor-engines." Sept. 15, 1875.

3267.—Turner, S., the younger, J., and R., Rochdale, "Improved means for securing the joints of steam and water pipes, and for other similar purposes." Sept. 18, 1875.

3316.—Bartrum, W. E., Streatham, London, "Improvements in rotary engines, pumps, or meters." Partly a communication. Sept. 22, 1875.

INVENTIONS PROTECTED FOR SIX MONTHS ON THE DEPOSIT OF COMPLETE SPECIFICATION.

3396.—Monckton, E. H. C., Wansford, Northampton, Creasy, J. T., Lambeth, and Tully, W., North Bow, London, "Improvements in apparatus or machinery for utilizing the pressure of water, oil, air, gas, steam, or other fluid as motive power." Sept. 29, 1875.

3601.—Chandler, S., jun., Southwark, London, "An improved arrangement or regulator for gas lights, whereby a more perfect combustion is attained." Oct. 16, 1875.

3625.—Clark, A. M., Chancery Lane, London, "Improvements in water-meters." A communication. Oct. 19, 1875.

PATENTS WHICH HAVE PASSED THE GREAT SEAL.

1619.—Haigh, B., Cubitt Town, London, "Improvements in water-closets." May 1, 1875.

1621.—Haigh, B., Cubitt Town, London, "Improvements in cocks or valves." May 1, 1875.

1625.—Pape, T., Nottingham, "An improved method of and apparatus for filtering and deodorizing sewage so as to prevent rivers being polluted thereby." May 3, 1875.

1693.—Popoff, M. A., St. Petersburg, "A new or improved ventilating, disinfecting, and deodorizing cover for water-closets, privies, urinals, night commodes, and other like utensils, also generally applicable to the disinfection and deodorization of fœtid or noxious gases and emanations." May 6, 1875.

1790.—JAMESON, J., and SCHAEFFER, A. G., Newcastle-upon-Tyne, "Improvements in centrifugal pumps." A communication. May 13, 1875.
1848.—CLARK, A. M., Chancery Lane, London, "Improvements in the method of impelling, conducting, or forcing air by the influence of a jet of air or steam, and in applying the same to various purposes." A communication. May 19, 1875.
2207.—HOLT, H. P., Leeds, "Improvements in steam-engines, more particularly with reference to valves for regulating the escape of waste water, injection, and vacuum." June 16, 1875.
2463.—HIGGINSON, A., Liverpool, "Improvements in engines and pumps." July 8, 1875.
2597.—TWEEDDALE, J., Edinburgh, "A new or improved instrument or instruments for directing and delivering liquids from hose or tubes." July 21, 1875.
2604.—BIRRELL, W., Lanark, "A new or improved apparatus for regulating the pressure or production of gases and liquids." July 21, 1875.
2621.—GILL, D., Weston-super-Mare, "Improved methods and apparatus for neutralizing and deodorizing the poisonous and noxious gases emitted from sewers and drains, and also the sewage matters contained therein." July 23, 1875.
2675.—HANSON, J., Dewsbury, York, "Improvements in the treatment of sewage and in the manufacture of manure therefrom." July 28, 1875.
2701.—HICKS, J. J., Hatton Garden, London, "Improvements in instruments, commonly called 'hydrometers,' for testing the specific gravity of liquids." July 30, 1875.
2725.—AITKEN, H., Stirling, and YOUNG, W., Renfrew, "Improvements in the manufacture of illuminating gas and in the apparatus employed therefor." Aug. 3, 1875.
2843.—ANDERSON, G., Westminster, London, "Improvements in apparatus for the more economical manufacture and supply of illuminating gas." Aug. 12, 1875.
2986.—MALLINSON, J., Welwyn, Herts, "Improvements in cocks and in sluice and slide valves to regulate the flow of steam, water, and other fluids." Aug. 25, 1875.
3028.—BRIDGETT, G. A., Manchester, "Improvements in engines actuated by steam or compressed air for pumping and for other purposes." Aug. 28, 1875.
3070.—LAKE, W. R., Southampton Buildings, London, "Improvements in liquid-meters, which may also be used as pumps or motor-engines." A communication. Sept. 1, 1875.

PATENTS WHICH HAVE BECOME VOID
BY REASON OF THE NON-PAYMENT OF THE ADDITIONAL STAMP DUTY OF £50 BEFORE THE EXPIRATION OF THE THIRD YEAR.

2800.—PORTER, J. T. B., "Improvements in combined gas apparatus to be used on board ship." Sept. 21, 1872.
2847.—HARRISON, C. W. and A. H., "Improvements in combining atmospheric air and certain gases for lighting and heating purposes." Sept. 26, 1872.
2855.—M'KELVIE, J., "Improvements in the manufacture of illuminating gas." Sept. 27, 1872.

The GRAND MEDAL of MERIT at the VIENNA EXHIBITION has been AWARDED to

GWYNNE & BEALE'S PATENT IMPROVED GAS-EXHAUSTERS,

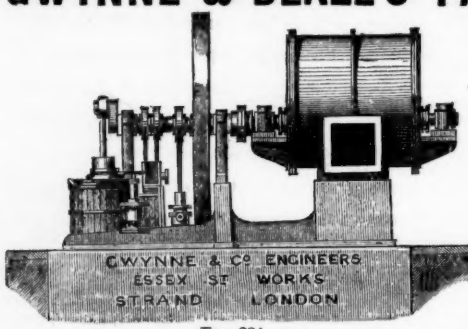


FIG. 224.

The BEST EXHAUSTERS IN THE WORLD.
Made under the personal superintendence of
Mr. BEALE,
The oldest Maker, Inventor and Patentee of
GAS-EXHAUSTING MACHINERY.
(It is NOT CORRECT to state that Mr. BEALE has RETIRED.)

Prices and every information on application.

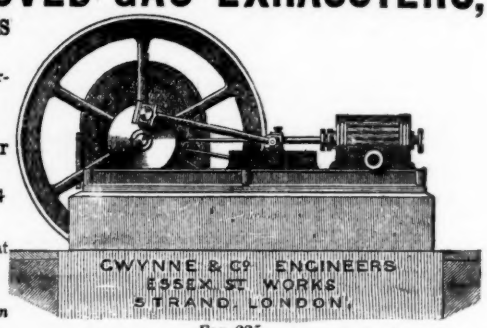


FIG. 225.

Fig. 224 represents one of those erected at the Imperial Gas-Works, Bromley, capable of passing 210,000 cubic feet of gas per hour. Several others of the same size are now on order for the same Company. These Patent Machines combine the highest quality of workmanship and materials, the largest bearings and wearing surfaces, with the **most perfect system of action yet discovered.** Fig. 225 represents one of a series of four at the Nottingham Gas-Works, each passing 52,500 cubic feet per hour. GWYNNE AND Co. *do not pretend to enter into a struggle with other makers in respect to cheapness. They have never sought to make price the chief consideration, but to produce Machinery of the very highest quality, and the most approved design and arrangement.* Their prices have been estimated with a due regard to the **excellence of the article produced,** and when this is taken into consideration, they have no fear for the result. The orders executed this season for Exhausters and alterations to their patented system amount to over 4,000,000 cubic feet of gas passed per hour, and to over 300 horse power for Engines to drive them. In every instance their work is giving the greatest satisfaction. Numerous testimonials and references can be given.

REGULATORS, BYE-PASSES, STOP-VALVES, GAS-VALVES, & MACHINERY FOR GAS MANUFACTURE, OF ALL SIZES,
CAN BE HAD ON APPLICATION TO
GWYNNE & CO., HYDRAULIC & GAS ENGINEERS, ESSEX STREET WORKS, STRAND, LONDON, W.C.
G. & Co. are now manufacturing for a London Gas Company three of their 210,000 *cubic feet Patent Gas Exhausters, and many of all sizes.*

SUTTON VALENCE GAS COMPANY, LIMITED.

WANTED, a second-hand Scrubber, with bye-pass valve and 4-in. connexions complete, about 24 in. diameter and 9 or 10 ft. high.
Particulars and price to be sent to E. LONG, Secretary.

WANTED, a situation as Manager of a small Gas-Work. Understands main and service laying, meter and gas fitting, internal fitting and retort-setting. Twelve years testimonials.
Address No. 213, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, the Management or Assistant Management of a Gas-Work. Five years practical experience in the manufacture and distribution of gas.
Address No. 214, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, by the Sherborne Gas Company, a steady MAN, who understands the erection of fittings, laying mains and services, and is thoroughly accustomed to the routine of a Gas-Work. Character and testimonials required.
Apply to T. W. R. WHITE, Manager and Secretary.
Oct. 29, 1875.

RIPON CITY GAS-WORKS.

WANTED, a good steady Man as Main and SERVICE LAYER. Able to fix and take the indices of meters, and to do the necessary repairs upon the works. One accustomed to an engine and exhauster preferred. Wages 30s. per week. A few good STOKERS are also required.
Apply, with references, to Mr. ROBERT DARNEY, the Manager.

TO GAS COMPANIES AND GAS ENGINEERS.

WANTED, by a Gentleman, a situation as ASSISTANT ENGINEER or Draughtsman, either in a Gas-Works or Gas Engineering Works. Thoroughly conversant with all the details, having had much experience in designing, superintending the construction and erection of new Gas-Works, Apparatus, &c.; also extensions and alterations of the same. Is a good draughtsman. Can prepare working drawings, quantities, &c. Over 14 years experience with an extensive Gas Engineering Firm. First-class references or testimonials.
Address G. E., care of Mr. W. W. Thomas, 7, Westminster Chambers, Victoria Street, WESTMINSTER, S.W.

FOR SALE, at an extraordinarily low price, Five small GASHOLDERS, 10 ft. diameter by 10 ft. deep, complete with tanks, chains, and weights. May be had separately.
Apply to K. W. HEDGES AND Co., Engineers, 36, KING WILLIAM STREET, E.C.

WANTED, GAS-WORKS TO LEASE.

THE Engineer of a Work of acknowledged repute is desirous of LEASING a small work. Can offer unusual advantages to companies or proprietors whose undertakings are unremunerative, or have fallen into a dilapidated condition.
Address No. 202, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WORKING FOREMAN.

REQUIRED immediately, the services of an efficient MAN on a work within 25 miles of London, making about 12 millions. He must be used to the working of an exhauster, a good fitter and main layer, and thoroughly conversant with all the duties of the position. Wages 32s. 6d. per week, with house, gas, and coals.
Address No. 215, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

NEW EDITION, NOW READY,

ADVANTAGES OF GAS FOR COOKING AND HEATING.

By MAGNUS OHREN, A.I.C.E., F.C.S.

For Companies to issue to their Gas Consumers.

Specimen Copy by post Threepence, direct from MAGNUS OHREN, Gas-Works Lower Sydenham, London, S.E.

GAS-WORKS TO BE LET.

TO BE LET, on Lease, for a term of years, the Lower Gornall Gas-Works, Staffordshire.
The works are situated in a very populous neighbourhood, are fitted up with every requisite, are in full operation, and the make of gas and the number of consumers are steadily increasing.
Possession may be had on the 1st of January next, when the present lessee's term expires.
Apply to Mr. F. KENNING, Secretary, District Gaslight Company, Limited, 21, Darlington Street, WOLVERHAMPTON.

ROCHDALE CORPORATION.

THE Gas Committee of the Rochdale Corporation invite TENDERS for 2000 lineal yards of 2-in. Cast-Iron PIPES, turned and bored.
All further particulars may be obtained from Mr. Paterson, the Manager of the Gas-Works.
Tenders, endorsed "Gas-Main," to be sent to me on or before Nov. 9, 1875.
The Committee do not bind themselves to accept the lowest or any tender.
By order,
ZACH. MELLOR, Town-Clerk.
Town-Hall, Rochdale, Oct. 29, 1875.

THE Advertiser, aged 32, a gas-fitter, with 11 years experience as fitter in different Gas-Works, and a good knowledge of office work, seeks a situation as CLERK and Inspector. Very willing to make himself useful. Unexceptionable reference.
Address No. 203, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

SOCIÉTÉ TECHNIQUE
DE
L'INDUSTRIE du GAZ en FRANCE.
(FRENCH ASSOCIATION OF GAS MANAGERS.)

MEETING for 1876.—PREMIUMS for PAPERS.

The Committee of the above Society beg to announce that at the forthcoming ANNUAL MEETING, to be held at LYONS in the month of MAY next,

A PREMIUM OF 500 FRANCS,

voted at the General Meeting on the 24th of May last, will be awarded to the Author of the best unpublished Paper, in French,

"On the Progress made in Gas Industry during the past Ten Years."

The work is to be an exhaustive study of the subject, and not merely an historical survey. Each Author will be at liberty to treat more particularly one of the principal branches of the industry.

A PREMIUM OF 250 FRANCS,

offered by a Member of the Committee, will also be awarded to the Author of the best unpublished Paper, in French,

"On the Best and Most Economical Means of Laying Mains Gas-tight, and of Discovering and Remedying Escapes."

CONDITIONS OF COMPETITION.

1. All persons, whether Frenchmen or foreigners, Members of the Société Technique or not, are eligible to compete.
2. The Papers must be unpublished productions, and written in French.
3. Each Paper must bear upon its front page a motto, which must also be written upon a sealed envelope containing the name of the Author.
4. The Manuscripts must be deposited in the Society's Offices, 21, Rue Abbatucci, Paris, before March 1, 1876.
5. All the Papers will remain deposited in the archives of the Society.
6. The successful Papers will be published in the Society's Annual Report.
7. The Premiums will be awarded by the Committee on the Report of a Commission of Five Members nominated by it.
8. The Premiums will be awarded in General Meeting.

MESSRS. JOHN BETHELL & CO.,

(ESTABLISHED 1836,)

CONTRACTORS for GAS TAR,

MAKERS OF ANTHRACENE, CREOSOTE, &c.,

CLAYTON CHEMICAL WORKS, MANCHESTER;
SWAN VILLAGE, WEST BROMWICH.

Head Offices: 38, KING WILLIAM STREET, LONDON BRIDGE.

B. GIBBONS, JUN.,

DIBDALE FIRE-CLAY, BRICK, AND GAS-RETORT WORKS,
STOURBRIDGE (Established 1834),
MANUFACTURER OF EVERY DESCRIPTION OF

Burs, Lumps, Stays, Shields & other Bricks, & Gas-Retorts.

A LARGE QUANTITY OF RETORTS ALWAYS IN STOCK.

Circular .	14 in.,	15 in.,	16 in.,	18 in.
Ovals . .	17 in. × 14 in.,	17 in. × 15 in.,	20 in. × 15 in.,	21 in. × 15 in., &c.
D's. . .	14 in. × 14 in.,	15 in. × 12 in.,	15 in. × 13 in.,	17 in. × 14 in., 18 in. × 13 in.
	18 in. × 15 in.,	20 in. × 16 in.,	22 in. × 14 in.,	24 in. × 14 in., 24 in. × 15 in., &c.

Special attention given to the execution of Export Orders.

CLYDE TUBE WORKS, GLASGOW & COATBRIDGE.

OFFICES, 41, OSWALD STREET, GLASGOW,

ANDREW & JAMES STEWART,

MANUFACTURERS OF
WROUGHT-IRON WELDED TUBES AND FITTINGS,
GUN METAL & OTHER COCKS, ALL KINDS OF IRON & BRASS FITTINGS
For GAS, WATER, and STEAM;
CAST-IRON PIPES, CORE BARS for IRONFOUNDERS,
STOCKS, DIES, and TAPS, GAS PLIERS and TONGS, &c., &c.,
ALWAYS KEPT IN STOCK.

LAP-WELDED IRON BOILER TUBES,

As supplied to the English, French, and Dutch Admiralties, and principal Railways and Engineers at Home and Abroad.

JAMES MILNE & SON,

GAS ENGINEERS,
Gas-Meter, Gas Apparatus, and Gas-Fittings Manufacturers,
EDINBURGH, AND
2, KING EDWARD STREET,
NEWGATE STREET, LONDON.

Meter Works in London—2, CROSS STREET, WILDERNESS ROW, E.C.

STATION-METERS, GOVERNORS, CONSUMERS METERS, GAS LUSTRES,
CHANDELIERS, BRACKETS, &c.,
And every description of Gas-Fittings and Gas Apparatus.

TO GASHOLDER MAKERS.

THE Oldham Corporation Gas and Water Works Committee are prepared to receive TENDERS for supplying and erecting one Telescopic GASHOLDER, 100 ft. diameter, at their Hollinwood Gas Station.

Plans and specification may be seen on application Mr. Herbert Andrew, Gas and Water Offices, Oldham.

Tenders to be sent in on or before Tuesday, Nov. 9, 1875.

The lowest or any tender not necessarily accepted.

By order,
H. BOOTH, Town-Clerk.

Oldham, Oct. 19, 1875.

TO GAS ENGINEERS.

THE Engineer and Manager of the Blackburn Gaslight Company lately having died, the Directors of the Company are open to receive APPLICATIONS from thoroughly qualified persons for the appointment of ENGINEER and General Out-door Manager of their several works.

Whoever is appointed will be required to reside in the town, and to devote his whole time to the duties of the Office.

Applications, stating salary required, and date when applicant can enter on his duties, to be sent, with testimonials, to Joseph Harrison, Esq., Chairman of the Company, on or before Tuesday, the 9th of November next.

DIXON ROBINSON, Clerk to the Company.

Blackburn, Oct. 22, 1875.

STATION-METER, second-hand, for SALE, in good condition. Capable of passing 8000 feet per hour, together with bye-pass, valves, and connexions complete. To be sold to make room for a larger one.

Apply to Mr. C. TURNER, Manager, Gas-Works, RAVENSTHORPE, MIRFIELD.

STATION-METER for Sale, in good condition (Makers West and Gregson) in very ornamental case, fitted up with tell-tales, inlet, outlet, and bye-pass valves, and 12-in. connexions. Passes 25,000 cubic feet per hour. Now replaced with a larger one.

For price, &c., apply to JOHN W. WHITAKER, Manager, Gas-Works, WAKEFIELD.

COST PRICE SHEETS.

MANUFACTURE AND DISTRIBU- TION OF GAS. These sheets are the same as were laid before the Dublin Meeting of the British Association of Gas Managers; but in the REPRINT, NOTES have been added for the guidance of those using them. Copies of the two sheets may now be had, price 5s.

South Shields. W. J. WARNER.

BIRTLEY IRON WORKS,
CHESTER-LE-STREET,
DURHAM.

Manufactory for every description of Casting and Machinery for Gas-Works and Water-Works.

Warehouse in London for Cast-Iron Pipes and Connexions of all sizes and in any quantity, Scott's Wharf, Bankside, Southwark.

Agent in London, Mr. J. MANWARING, 101 Cannon Street, E.C.

HOPKINS, GILKES, & CO.,
LIMITED,
MIDDLESBOROUGH,

SUPPLY GAS & WATER PIPES of EVERY SIZE.
Plain, Turned and Bored, and Coated.
CAST-IRON RETORTS.
Castings for Gas-Works of every description.
EXHAUSTERS.

LONDON OFFICE: 25, LAURENCE POUNTNEY LANE.

WATER-MAINS.

COTTERILL'S PATENT STEEL TUBE- DRILLS, for connecting services to water-mains, *under pressure*, without turning off the water. They drill and tap themselves, and are left in the mains. Made of all sizes, from ¾ to 2 inches and upwards. They cost less than the ordinary plan.

Apply to CHARLES FORSTER COTTERILL, Cannock, STAFFORD, Patentee.

D. BRUCE PEEBLES & CO.,

ENGINEERS,
FOUNTAINBRIDGE WORKS, EDINBURGH,

MANUFACTURERS OF WET AND DRY GAS-METERS;

Patentees and Sole Manufacturers of PEEBLES' LAMP-GOVERNORS,

ABOVE 30,000 OF WHICH ARE NOW IN USE.

"These Lamp-Governors are so superior that they are likely to supplant all others."—*Dr. Wm. Wallace, F.R.S., F.C.S.*

D. BRUCE PEEBLES AND CO., FOUNTAINBRIDGE WORKS, EDINBURGH.

THE

LANCASHIRE GAS-METER COMPANY,

LIMITED,

FALCON STREET, OLDHAM,

MANUFACTURERS OF

GAS-METERS, GOVERNORS, EXPERIMENTAL GASHOLDERS, &c.

HENRY THOMAS, Managing Director.

MR. HODGSON JONES, Memb. Inst. Civil Engineers of London and of Paris, has REMOVED his Offices to 26, Great George Street, London, S.W., where he may be consulted on all questions relating to Gas and Water Works, Drainage, Sanitary Works and Estate Improvements.

T. NEWBIGGING,
CONSULTING GAS ENGINEER,
ECCLES, MANCHESTER.

HENRY LYON,
CONSULTING GAS ENGINEER,
BROOKLYN, CHEETHAM HILL ROAD,
MANCHESTER.
Twenty-three years at the Rochdale Road Works.

D. M. NELSON,
48, GORDON STREET (late 135, BUCHANAN ST.),
GLASGOW,
Supplies every requisite in connexion with the distribution of Gas and Water.
Estimates and prices on application.
WOOD GRIDS for Purifiers and Scrubbers.
Cast-Iron PIPES and VALVES.
Street LAMP-PILLARS.
Patent Pipe SCREWING-MACHINES, &c.

Mr. ALFRED LASS,
60, CORNHILL, LONDON, E.C.,
Is prepared to open the Books, and, if necessary, keep the Accounts of Gas and Water Companies.
To examine the Books and Accounts, and prepare Balance-Sheets for the information of Directors.
To assist Secretaries in preparing Balance-Sheets, according to the "Gas-Works Clauses Act, 1871;" or may be consulted with respect to Accounts generally.

TO INVENTORS AND PATENTEES.
MR. W. H. BENNETT, having had considerable experience in matters connected with Gas, Water, and Sanitary Improvement, begs to say that he continues to assist Inventors in the perfection of their designs, and to obtain for them PROVISIONAL PROTECTION, whereby their invention may be secured for Six Months; or LETTERS PATENT, which are granted for Fourteen Years.
Patents completed, or proceeded with at any stage, thereby rendering it unnecessary for persons resident in the country to visit London.
Patents procured for Foreign Countries.
Information as to cost, &c, supplied gratuitously upon application to the Advertiser, 22, Great George Street WESTMINSTER.

IN THE MATTER OF BRONNER'S PATENT BURNERS.
NOTICE is Hereby Given that Julius Brönner, on the 20th of April, 1875, in a suit in Chancery, 1874, B 365, obtained an injunction perpetually restraining the Defendant, his Agents, Servants, and Workmen, from in any way advertising or offering for sale, or selling, or from in any manner causing to be advertised, or offered for sale, or sold as "Real Brönner," or "Brönner," or "Broehner" Burners, any Burner not manufactured by or for the Plaintiff, Julius Brönner, or by his Agents.
JACKSON, FOX, AND ELLEN,
55, Chancery Lane, London,
Solicitors for the Plaintiff,
JULIUS BRÖNNER, Frankfort-on-Maine.

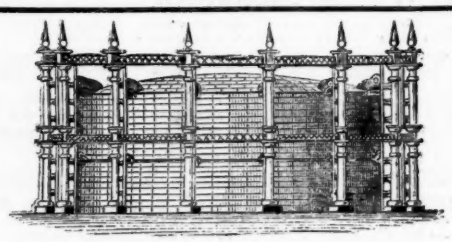
BAILEY'S Patented Inventions are now in extensive use wherever steam is known. Bailey's Patent Steam Gauges, Pyrometers, Water Gauge Cocks, Test Pumps, Fusible Plugs, Steam and Water Valves, Safety Valves, Junction Valves, Pumps, Tell-Tales, Recorders, Lightning Conductors, Electric Telegraphs, Turret Clocks, Steam Joint Cement, Lifting Jacks, Boiler Feeders, Lime Catcher and Separator, Injectors and Ejectors, and every description of first-class Brass Work for Engines and Boilers. Gas-Works Managers who have not our large book should send for it.
16th edition, 1000 engravings, 4to., post free 2s. in stamps, weight 10 oz., cost of production £1000.

BAILEY'S Illustrated Inventions, containing details and prices of goods in our five several departments:—(1) Brass Foundry, Steam Gauges, Indicators, Feeders, and Fittings; (2) Engineers Sundries, Small Tools, and Stores; (3) Machine Pump and Fire Engine: (4) Turret Clock, &c.; (5) Electric Telegraph, A B C Instruments, Bells, and Apparatus.
J. BAILEY and Co., Albion Works, Salford, LANCASHIRE.

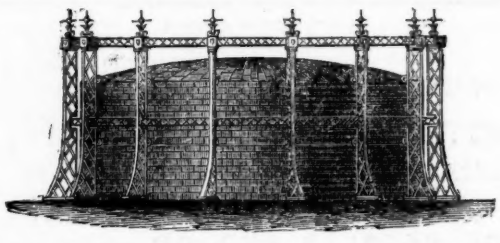
BRAY'S PATENT "ENAMEL" REGU- LATOR GAS-BURNERS.
At the meeting of the North British Association of Gas Managers, held in Dundee in July last, the President, G. R. HISLOP, Esq., spoke very highly of a Gas-Burner, the name of which he did not give. In reply to letter from us, we received the following:—
"Gas-Works, Paisley, Aug. 17, 1875.
"Geo. R. Hislop, Engineer and Manager.
"Dear Sirs,—Your letter and circular referring to your Gas-Burners are to hand, and it will be gratifying to you to know that the Burners I referred to at the meeting of the North British Association of Gas Managers, held in Dundee last month, were your 'Regulator Burners.' I have not only purchased these exclusively for a considerable time past, but have very largely recommended their use to parties in different parts of the country—a fact, the bare mention of which should suffice to convey to you the high opinion I hold of the Burners of your manufacture. But, further, while second to the old iron burners only in price, they are second to none in the economic elicitation of light from a given quantity of gas, burned, of course, under conditions of pressure and volume proper to the size of each burner.
"I am, dear sirs, yours faithfully,
"GEO. R. HISLOP.
"Messrs. Geo. Bray and Co."
☞ *The Price is little more than common Burners.*
To be had of Dealers in Gas-Fittings throughout the World.

TO GAS COMPANIES AND THE TRADE.
J. DEFRIES & SONS,
MANUFACTURERS OF
CRYSTAL, BRONZED, & ORMOLU CHANDELIERS, IMPROVED CRYSTAL STAR & SUN LIGHTS, VESTIBULE LAMPS, AND THE PATENT CRYSTAL ILLUMINATION.
A LARGE STOCK ALWAYS IN HAND OF
IRON, BRASS, COMPOSITE, AND LEAD TUBES, FOR GAS AND WATER,
AND EVERY DESCRIPTION OF
GAS AND WATER FITTINGS.
THE PATENT DRY AND WET METER, WITH THE LATEST IMPROVEMENTS.
STREET LAMPS AND COLUMNS IN GREAT VARIETY.
WORKS: LONDON AND BIRMINGHAM.

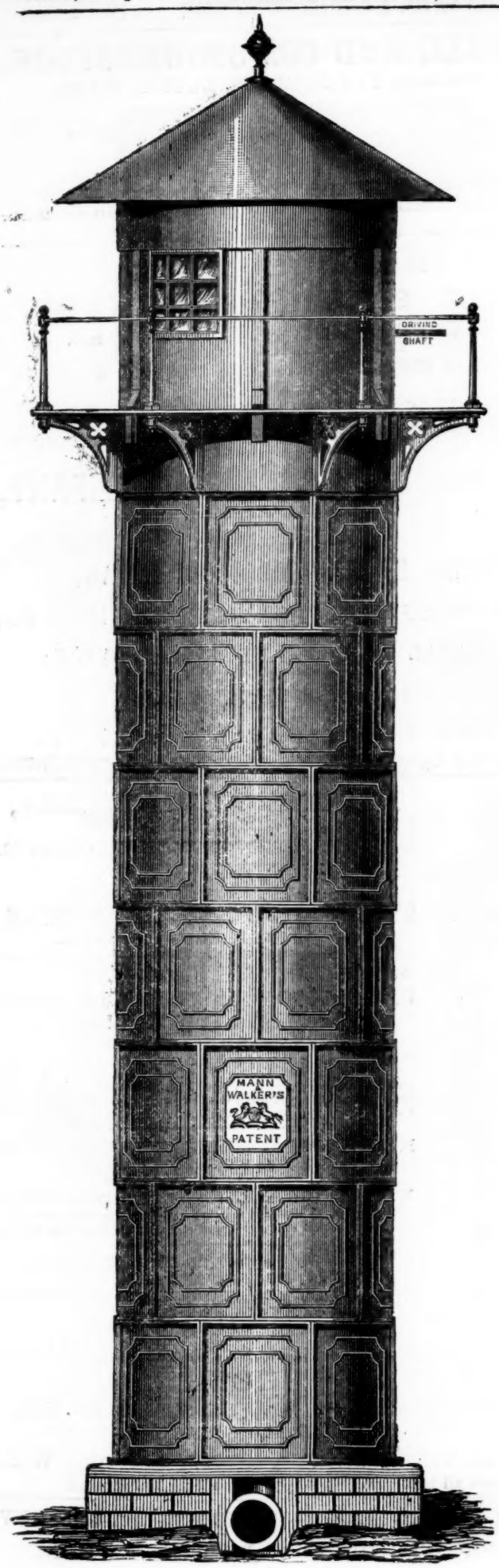
GAS MOONS, Cut and Engraved, of the newest designs
GAS REFLECTORS In Silver and Glass
GAS NIBS AND **BURNERS** Of every description.
Pattern-Books of Gas-Fittings, Crystal and Ormolu Chandeliers for 1873, are now complete.
City Show-Rooms and Manufactory, 147, HOUNDSDITCH, LONDON.
ESTABLISHED 1830.

HOPE IRON WORKS,

STOCKTON ON TEES.

ASHMORE & WHILE,
GAS ENGINEERS & CONTRACTORS,
MANUFACTURERS OF GASHOLDERS,
GAS APPARATUS OF EVERY DESCRIPTION,
Including Improved
Retort-Lids, Boilers, Cast and Wrought Iron Tanks, Iron Roofing, Bridges, Girders,
And GENERAL IRONWORX.
N.B—Estimates for all Gas Plant and Remodelling supplied on application.



THE HORSELEY COMPANY,
LIMITED,
TIPTON, STAFFORDSHIRE.
LONDON OFFICE:
6, WESTMINSTER CHAMBERS, VICTORIA STREET,
GAS ENGINEERS, IRONFOUNDERS, &c.,
MANUFACTURERS OF
GASHOLDERS, WROUGHT AND CAST IRON TANKS, CONDENSERS, PURIFIERS, SCRUBBERS, MAINS, RETORT-LIDS, PLAIN AND DISHED, LAMP-POSTS, PIPES,
AND ALL REQUISITES FOR EITHER
GAS OR WATER WORKS;
ALSO
MAKERS OF ROOFS, BRIDGES, &c.



C. & W. WALKER,
8, FINSBURY CIRCUS,
LONDON, E.C.

MANN & WALKERS' PATENT SCRUBBER.

By Letters Patent in Great Britain, Europe, and the United States of America.

The improvements made during the past three or four years in all the parts of the internal and external construction and machinery of these Scrubbers have rendered them perfect for their work of purification with all kinds of coal, and their cost is less than any other method of completely purifying gas from ammonia.

They contain their own motive power, re- quiring only a small inappreciable quantity of steam from the gas-works boiler, and are then complete in themselves, ready for service.

They are, in all cases, constructed under guarantees to perfectly perform their work. They are now extensively used in the largest gas-works of London and the chief cities of Europe, **nearly one hundred being in use,** and their perfect efficiency and profit to a gas company have been fully established with every variety of coal used in Europe. References can be given to the largest gas-works in Europe.

By their use the department of purification from ammonia upon a gas-works is made complete, without the aid of prepared oxide of iron, chemicals in purifiers, or any other supplementary process, and the whole ammoniacal residual product contained in the coal is absorbed and obtained in the form most profitable to a gas company, while the requirements of all Acts of Parliament and of the Board of Trade, relating to incorporate gas companies, are satisfied.

Foul Gas, properly condensed, entering the inlet is, by once only passing through the Scrubber, completely purified from ammonia with regular certainty day by day, without any further trouble, or any other process, effected by a very small quantity of clear water let into the machinery room at the top of the Scrubber, which is discharged at the liquor outlet at the bottom, from Newcastle coal at about 18 to 20 ounces strength, from Yorkshire and other coals generally from 25 to 30 ounces strength; while acidulated litmus or turmeric exposed at the Scrubber outlet will not show the slightest discoloration, and there is not a quarter of a grain of ammonia per 100 feet left unabsorbed.

Applications relating to dimensions and prices should be addressed to us, C. AND W. WALKER, 8, FINSBURY CIRCUS, LONDON, E.C., or to Mr. WILLIAM MANN, late Superintendent of the Chartered Gas-Works, BLACKFRIARS, LONDON; they should state approximately the largest make of gas in 24 hours on a winter's day, and the smallest make on a summer's day, to be purified.

INTERNATIONAL EXHIBITION, 1862.
CLASS X.
PRIZE MEDAL
For excellence of Fire-Clay Gas Retorts, and
"HONOURABLE MENTION" for
good quality of Fire-Bricks.
WILLIAM STEPHENSON & SONS,
THROCKLEY,
NEWCASTLE-ON-TYNE.

JAMES OAKES & CO.,
ALFRETON IRON-WORKS, DERBYSHIRE,
AND
WENLOCK IRON WHARF, 21 & 22, WHARF ROAD,
CITY ROAD, LONDON, N.,
Keep in London and at their works large stocks of PIPES and CONNEXIONS (1½ to 36 inches in diameter); also make and supply Retorts, Tanks, Columns, Girders, Special Castings required by Gas, Water, Railway, Telegraph, Chemical, Colliery, and other Companies.
CHARLES HORSLEY, Agent.

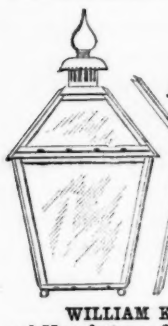
BELGIAN CLAY RETORTS.
J. SUGG and CO., late ALBERT KELLER, GHENT.—The removal of the import duties on Earthenware permitting the entry of Clay Retorts into England, Messrs. Sugg, of Ghent, beg to draw the attention of the Gas Companies of London, and other Cities, to the very superior quality of the RETORTS manufactured by them. They can be made of any size, in one piece, and of any form. The price will be in proportion to the weight, and very moderate in comparison to their value.
Communications addressed to J. SUGG & CO., GHENT, will receive immediate attention.

FIRE-CLAY RETORTS.
WILLIAM FRASER,
INVERKEITHING,
Owner of the Works at which Fire-Clay Retorts were first made), can supply
RETORTS, FIRE-BRICKS, &c.,
to any extent.
References can be given to managers of above a hundred Gas-Works whom he supplies.
He ships at Charlestown his
CELEBRATED HALBEATH STEAM COALS,
on Navy List.

JAMES NEWTON & SONS,
(Established 1820,)
FIRE-BRICK AND TILE MERCHANTS,
Wholesale and for Exportation,
FALCON DOCK, 78 AND 79, BANKSIDE,
SOUTHWARK, LONDON, S.E.,
DEPÔT for STOURBRIDGE AND NEWCASTLE
FIRE-BRICKS, LUMPS, TILES, and FIRE-CLAY,
and every Article suitable for
GAS AND WATER WORKS.

PRICE'S PATENT COKE & COAL BARROW

effecting a great saving of time, labour, and expense.
For particulars, price, &c., apply to Mr. E. PRICE, Inventor and Patentee, Gas-Works, Hampton Wick, MIDDLESEX.


GAS COMPANIES
AND
LOCAL BOARDS
Requiring New Street-Lamps are recommended
A KEEN'S PATENT
DOUBLE-CLIP
STREET-LAMP.
A great improvement on the old-fashioned 14-in. Lamps.
They have been sold to various Gas-Works throughout
B the country and abroad, and the highest satisfactory testimonials are given as to their superiority.
For particulars of price, &c., apply to
WILLIAM KEEN, Sole Proprietor
and Manufacturer, Robertson Street, HASTINGS.

LEATHER DRIVING BANDS,
Hose-Pipes and Fire-Buckets,
Canvas Hose,
Sponge Cloths,
Cotton Waste, &c.

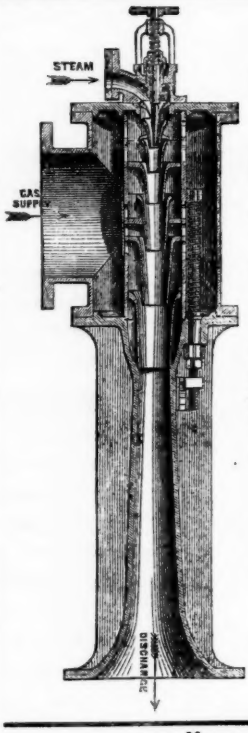
India-Rubber Belting, Hose, Valves, Packing, &c.
Contractors to Her Majesty's Government, Railways, &c.
Price Lists on application.
STOKERS MITTS FOR GAS COMPANIES.
WILLIAM GOODWIN AND CO.,
MANUFACTURERS,
CURRIERS, AND LEATHER MERCHANTS,
36, PRIMROSE STREET, BISHOPSGATE,
LONDON, E.C.

JOHN HALL AND CO., STOURBRIDGE,
Manufacturers of FIRE-BRICKS, LUMPS, TILES,

AND EVERY DESCRIPTION OF FIRE-CLAY GOODS.
N.B.—A Stock of 15 and 16 in. CIRCULAR RETORTS always on hand. Other kinds made to order on short Notice.

ALFRED WILLIAMS,
PHŒNIX FIRE-BRICK WHARF,
64, BANKSIDE, SOUTHWARK, LONDON, S.E.
GAS ENGINEER AND CONTRACTOR FOR THE ERECTION OF GAS-WORKS,
AND FOR THE
SUPPLY OF RETORTS, FIRE-BRICKS, CAST-IRON MAINS,
AND ALL MATERIALS FOR GAS MANUFACTURE AND DISTRIBUTION.

SPENCE BROTHERS CHEMICAL COMPANY,
LIMITED.
SOLE MANUFACTURERS OF
SPENCE'S PATENT DRY COPPERAS;
CONTRACTORS FOR THE
PURIFICATION OF COAL GAS BY OXIDE OF IRON, &c.;
PURCHASERS OF
AMMONIACAL LIQUOR AND SPENT OXIDE;
MAKERS OF
OXIDE AND OTHER PAINTS;
AND
GENERAL CHEMICAL MERCHANTS.
Address: VICTORIA CHEMICAL WORKS, BRADFORD, near MANCHESTER.



KÖRTING BROTHERS,
SOLE LICENSEES FOR
W. CLELAND'S PATENT STEAM-JET GAS-EXHAUSTER.
E. KÖRTING'S PATENT
STEAM-JET GAS-EXHAUSTER.
Small Cost—Compactness—Perfectly Self-Acting—
Self-Regulating—Self-Cleansing—No Steam-Engine—No Attention—
No Extra Room Required—No Wear and Tear—No Noise—
No Oscillation in Vacuum, or Back Pressure.
UPWARDS OF 150 IN USE IN CONTINENTAL GAS-WORKS.
IN ENGLAND SUPPLIED TO—
Chartered Gas Co., London; London Gaslight Co., London; South Metropolitan Gas Co., London; Phœnix Gas Co., London; Liverpool Gas Co., Linacre; Corporation Gas-Works, Bolton; Cornholme District Gas-Works; Epsom and Ewell Gas Company; Horsham Gas Company; Gaslight Company, Ipswich; Gaslight and Coke Company, Cheltenham.
E. KÖRTING'S PATENT STEAM-JET REVIVIFYING BLOWERS FOR THE PURIFYING MATERIAL.
W. CLELAND'S PATENT STEAM GAS-SCRUBBER,
Combining small cost and thorough efficiency, with absence of any mechanical means and necessity of renewing the scrubbing material.
For particulars, apply to KÖRTING BROTHERS,
STEAM-JET ENGINEERS,
7, LANCASTER AVENUE, MANCHESTER.
CELLERSTR. 35, HANNOVER, GERMANY.
11, RUE LOUIS-LE-GRAND, PARIS.
222, WALNUT STREET, PHILADELPHIA, U.S.

KÖRTING BROTHERS,
STEAM-JET GAS-EXHAUSTERS AND REVIVIFYING BLOWERS FOR OXIDE.
LONDON AGENT AND AGENT FOR SOUTH OF ENGLAND:
GERALD J. TUPP, 8, John Street, Adelphi, W.C.,
To whom all inquiries for these districts should be addressed.

DEMPSTER, MOORE, & CO., 49, ROBERTSON ST., GLASGOW,
SOLE AGENTS IN SCOTLAND FOR KÖRTING BROTHERS.

J. & J. BRADDOCK,

GAS ENGINEERS,

GLOBE METER-WORKS, OLDHAM,

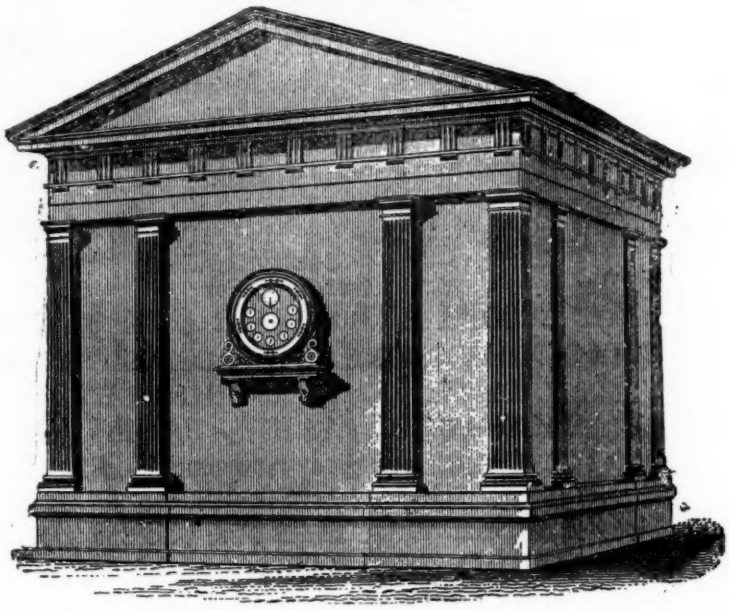
MANUFACTURERS OF

WET & DRY CONSUMERS GAS-METERS

OF THE HIGHEST EXCELLENCE;

ROUND STATION-METERS,

ON CAST-IRON STANDS.



SQUARE STATION-METERS,

WITH PLANED JOINTS.

GOVERNORS, GAUGES, INDICATORS, MAIN COCKS, &c.

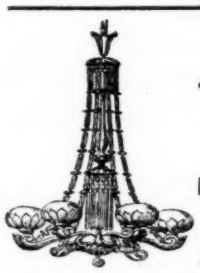
GAS COOKING APPARATUS.

Home and Foreign Orders promptly attended to.

All Sizes of CONSUMERS METERS, STATION-METERS, and GOVERNORS generally in Stock.

Orders almost invariably despatched on the day of receipt.

TERMS, &c., ON APPLICATION.



F. & C. OSLER,

45, OXFORD STREET, LONDON, W.

MANUFACTORY AND SHOW-ROOMS:

BROAD STREET. BIRMINGHAM.

ESTABLISHED 1807.

MANUFACTURERS OF CRYSTAL GLASS CHANDELIERS,

WALL LIGHTS, AND LUSTRES FOR GAS AND CANDLES.

TABLE GLASS OF ALL KINDS.

CHANDELIERS IN BRONZE AND ORMOLU. MODERATOR LAMPS.

GEORGE ANDERSON,

GAS AND CONSULTING ENGINEER,

4, CANNON ROW, PARLIAMENT STREET, S.W.

Mr. ANDERSON advises Companies on all matters connected with the manufacture of Gas and the construction of Works.

PATENTEE and MANUFACTURER of the following Inventions:—

RETORT SETTINGS, heated by tar without the production of smoke.

STEAM-ENGINES and EXHAUSTERS, separately or combined.

FOUR-WAY VALVES, one of which is equal to three ordinary Valves.

STATION GOVERNORS—the Gasholder cannot tilt and cause accident.

BREEZE AND TAR FUEL MACHINE.

A Pamphlet containing Eighteen Illustrations of the foregoing, with letterpress of the construction of Works, post free, 2s. 6d.

N.B.—The second edition of this Work, *now ready*, contains Illustrations of the Machine for converting Breeze and Tar into Fuel for heating the Retorts.

"The Author is well qualified to speak authoritatively upon the important subjects to which his pamphlet refers."—*Artizan.*

ADDISON POTTER,

WILLINGTON QUAY,

NEAR NEWCASTLE-UPON-TYNE,

Manufacturer of

CLAY RETORTS, FIRE-BRICKS, AND EVERY DESCRIPTION OF FIRE-CLAY GOODS

CAFFALL, THOMAS, & CO.,

LIMITED,

Are prepared to supply and erect their

PATENT MOVEABLE SEALS

FOR DIP-PIPES,

Or to grant Licences for the Manufacture and Use of the same.

Particulars may be obtained on application at the Offices,

75, FLEET STREET, LONDON, E.C.

THOMAS READ & CO.,

BRAZILIAN IRON-WORKS,

MALTON, YORKS,

MANUFACTURERS OF

GAS and WATER PIPES,

Bends, Tees, and Irregulars,

AND

GENERAL FOUNDERS.

ESTIMATES and PRICES on APPLICATION.

C. & W. WALKER,

MIDLAND IRON-WORKS,

DONNINGTON, NEAR NEWPORT, SHROPSHIRE,

MANUFACTURERS OF

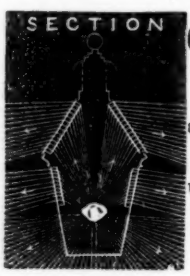
TELESCOPIC AND SINGLE-LIFT

GASHOLDERS,

CAST & WROUGHT IRON GASHOLDER-TANKS,

CONDENSERS, SCRUBBERS, & PURIFIERS.

LONDON: 8, FINSBURY CIRCUS, E.C.



THE PATENT

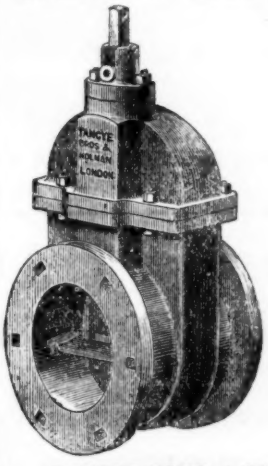
CATOPTRIC LAMP

Is now in use in Moorgate Street, Cheapside, and Trafalgar Square, and has been in successful operation upon Waterloo Bridge since Oct. 7, 1871.

T. A. SKELTON, 37, Essex St., Strand, LONDON, INVENTOR AND PATENTEE.

IMPROVED

GAS-VALVES,



AT GREATLY

REDUCED

PRICES.

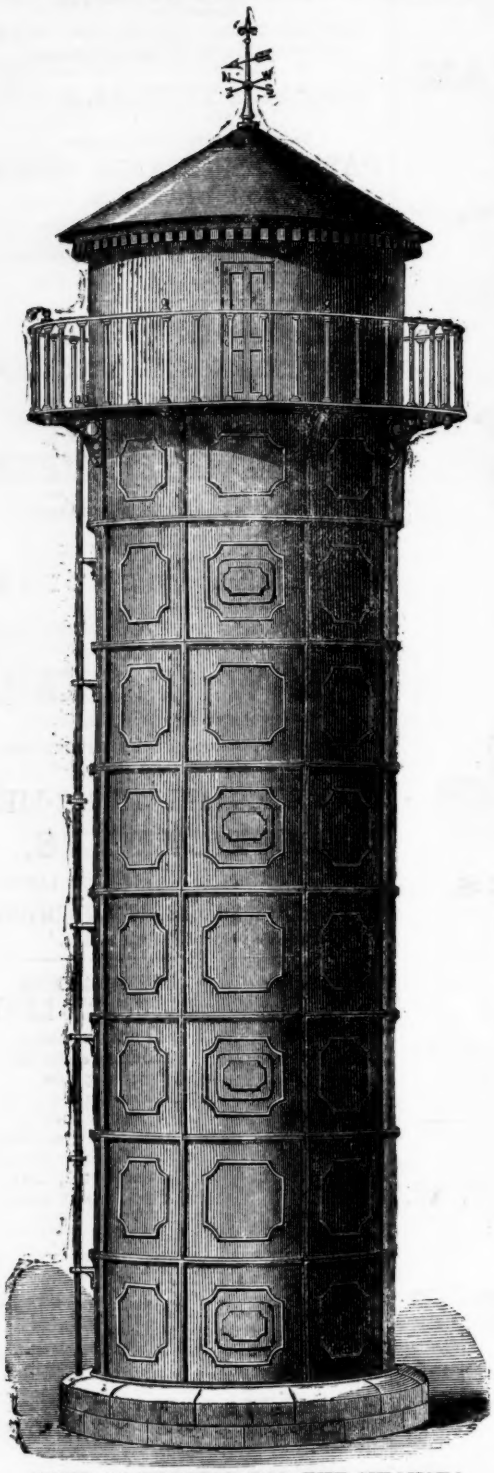
Inch.	s.	d.
3	25	0
4	36	0
5	40	0
6	54	0
7	63	0
8	80	0
9	85	0
10	100	0
12	120	0
14	140	0

TANGYE BROS. & HOLMAN,

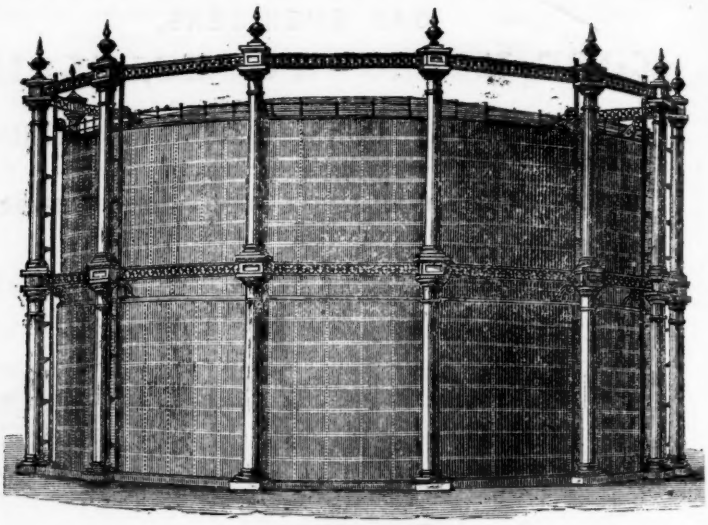
LAURENCE POUNTNEY LANE,

LONDON.

GEORGE WALLER & CO., GAS ENGINEERS,



SAME AS ERECTED FOR THE SWANSEA GAS COMPANY.



MANUFACTURERS OF

TELESCOPE AND SINGLE GASHOLDERS,
WROUGHT AND CAST IRON TANKS FOR SAME, BOILERS, GIRDERS, HYDRAULIC MAINS, ROOFS, &c.;
Coke Barrows, Stoking Tools.

SCRUBBERS, with MANN'S DISTRIBUTORS,
PURIFIERS AND CONDENSERS
(Wrought and Cast),
RETORT-HOUSE CASTINGS,
LAMP-POSTS, &c.; PATENT RETORT LIDS.

EVERY DESCRIPTION OF MACHINERY AND APPARATUS.
BEALE'S PATENT EXHAUSTERS,
WITH COMBINED OR SEPARATE ENGINES,
PUMPS, VALVES,
STEAM AND HYDRAULIC GOVERNORS,
HYDRAULIC AND STEAM MACHINERY FOR COAL LIFTING, &c., PURIFIER COVERS.

AWARDED a SILVER MEDAL at the MANCHESTER EXHIBITION of the SOCIETY for the PROMOTION of SCIENTIFIC INDUSTRY.

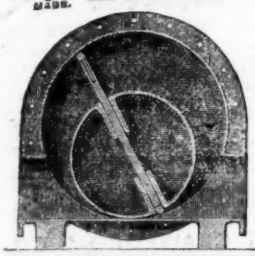
PHŒNIX ENGINEERING WORKS,
HOLLAND STREET, SOUTHWARK, S.E.,
and at **STROUD, GLOUCESTERSHIRE.**

JOSEPH AIRD,
WELLINGTON TUBE-WORKS, TIPTON, STAFFORDSHIRE,

MANUFACTURER OF

EVERY DESCRIPTION OF TUBING, GAS, STEAM, HYDRAULIC TUBES AND FITTINGS,
EITHER BLACK, GALVANIZED, OR ENAMELLED HOT WATER TUBES AND FITTINGS,
CORE BARS, COILS, COCKS (IRON OR BRASS),
CHANDELIERS, &c., GAS-FITTERS' TOOLS, GAS TONGS, STOCKS, TAPS, DIES, &c., &c.,
HANDRAIL TUBINGS, IRON AND BRASS, PLAIN OR TWISTED,
TELEGRAPH TUBES OR POLES, &c., &c.

J. BEALE'S PATENT GAS EXHAUSTER.



BEALE'S CONTINUOUSLY ACTING

GAS EXHAUSTERS

ARE NOW MANUFACTURED BY

B. DONKIN & CO.

Mr. J. Beale, of East Greenwich, having retired from business, has made an arrangement with B. DONKIN & CO. for the sole manufacture of his Patent Solid-Slide Gas Exhausters. B. D. & Co. also make Steam-Engines to drive Gas Exhausters direct or otherwise, and Gas-Valves.

Estimates and Prices on application to

B. DONKIN & CO.,
ENGINEERS & IRONFOUNDERS,
BERMONDSEY, LONDON, S.E.

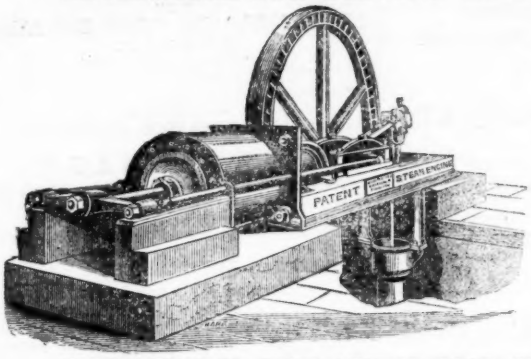
ECONOMY OF FUEL IN STEAM-ENGINES.

B. DONKIN & CO.,

PATENT HORIZONTAL COMPOUND CONDENSING

STEAM-ENGINES,

APPLICABLE FOR DRIVING GAS-EXHAUSTERS.



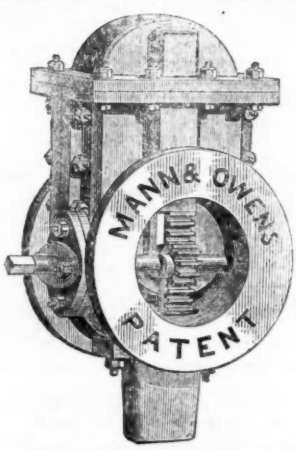
These Engines have been at work a sufficient number of years to prove their durability and efficiency.

One of them has been subjected to a scientific and exhaustive trial to test the consumption of fuel, with the result that an expenditure of less than **2 lbs.** of coal per hour developed one indicated horse power.

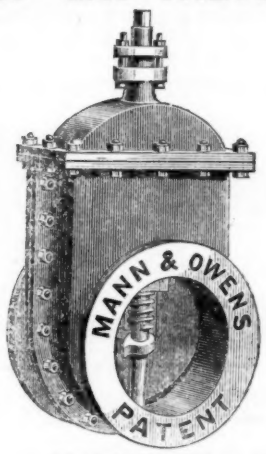
Full Details of this Trial, and Prices, sent on application to

B. DONKIN & CO., BLUE ANCHOR ROAD, BERMONDSEY, S.E.

MANN & OWENS' PATENT GAS-VALVE.



RACK AND PINION VALVE.



SCREW VALVE.

The advantages of this Patent Valve over all others yet introduced are, that it is always as tight as the best wedge or spring valve, without the possibility of setting fast or becoming suddenly leaky. The surfaces not being in contact during the operation of opening or closing, leakage through wear and tear is avoided.

The Gas Engineer will not fail to see the importance of such a valve in connexion with his purifying apparatus, particularly in the case of large sizes.

The slide being operated either by a screw and nut, or by a pinion and rack, a cam bearing upon a plane, cast on the back of the Valve, forces it against the face, and renders the escape of gas an impossibility. By a slight turn of the pinion or screw, the slide is released, and brought away from the face, by which means friction is avoided, and the only force required to open the Valve is that due to its own weight.

SOLE MANUFACTURERS:

S. OWENS AND CO.,

HYDRAULIC AND GENERAL ENGINEERS,

WHITEFRIARS STREET, LONDON, E.C.

PRICES, SIZES, AND FULL PARTICULARS ON APPLICATION.

THOMAS CARR & SON,

MANUFACTURERS OF

FIRE-BRICKS, LUMPS, TILES, RETORTS, &c., &c.,

SCOTSWOOD FIRE-BRICK WORKS,

SCOTSWOOD-ON-TYNE.

THOMAS LAMBERT & SONS

MANUFACTURE EVERY DESCRIPTION OF

GAS AND WATER FITTINGS;

ALSO,

WROUGHT-IRON TUBES & FITTINGS.

SHORT STREET, LAMBETH, LONDON.

TROTTER, HAINES, & CORBETT,

BRETTELL'S ESTATE

FIRE CLAY & BRICK WORKS,

STOURBRIDGE.

Manufacturers of GAS-RETORTS, GLASS-HOUSE FURNACE & BLAST-FURNACE BRICKS LUMPS, TILES, and every description of FIRE-BRICK.

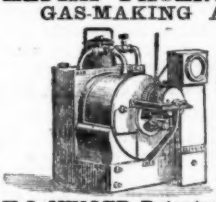
Proprietors of

BEST GLASS-HOUSE POT and CRUCIBLE CLAYS.

Successors to

E. Baker and Co., late Brierley Hill, Staffordshire.

ALPHA PATENT PORTABLE GAS-MAKING APPARATUS,



NOW MADE WITH

SELF-FEEDING ARRANGEMENT

Specially constructed for Country use.

No. 2 . . . 25 lights, £30.
No. 3 . . . 60 lights, £55.

Larger and smaller sizes in course of construction.

H. L. MULLER, Patentee and Manufacturer,
22, MARY ANN STREET, BIRMINGHAM.

B. CARPENTER,

THE ORIGINAL MANUFACTURER OF

WOOD SIEVES

FOR

GAS PURIFIERS & SCRUBBERS.

WORKS:

22, HERMES STREET, PENTONVILLE ROAD, LONDON, N.

"SELLARS' CEMENT"

PREVENTS WASTE OF GAS FROM RETORTS;

SAVES CLAY RETORTS FROM DESTRUCTION B FIRE;

GREATLY ECONOMIZES THE USE OF FIRE-BRICKS;

And PREVENTS ALL POSSIBLE LOSS of GAS FROM LEAKAGE.

J. C. SELLARS,

THE GAS CEMENT WORKS,

BIRKENHEAD.

LAMP-PILLARS,

GAS-LAMPS, FOUNTAINS.

Our New and Choice Designs for the above, with prices, are forwarded to any part of the world on receipt of twelve stamps. Estimates for work at home or abroad.

W. T. ALLEN & CO.,

GAS & WATER ENGINEERS & CONTRACTORS,

203, UPPER THAMES STREET,

LONDON, E.C.

GAS AND WATER PIPES.

WILLIAM MACLEOD & CO.,

16 & 20, ALSTON STREET, GLASGOW.

CAST-IRON GAS AND WATER PIPES.

DELIVERY F.O.B. ON CLYDE, OR STOCKTON-ON-TEES.

Prices on application.

ROBERT MARSHALL,

CANNEL COAL MERCHANT,

173, ST. VINCENT STREET, GLASGOW.

SHOTT'S BOGHEAD.

LOTHIAN'S CANNEL

Yields 12,500 cubic feet of 34-candle gas per ton, and 9 cwts. of excellent coke, containing only 4 per cent. of ash.

MUIRKIRK, No. 1, CANNEL

Yields 12,160 cubic feet of 32·5-candle gas per ton, and 10 cwts. of excellent coke, containing only 5 per cent. of ash.

OLD WEMYSS CANNEL

Yields 13,320 cubic feet of 32·5-candle gas per ton.

Prices and full Analyses on application.

ABRAM GAS COALS

from the

BICKERSHAW PITS, WIGAN,

Of the Abram Colliery Company, are worthy the attention of gas producers, showing a good yield of gas and a large residuum of excellent coke. When blended with one-seventh cannel, the gas is of specially high illuminating power.

Copies of analysis made at the Gas-Works, Salford, with an apparatus of full size, prices, and particulars of

BROCKELBANK BROTHERS,

11, LEADENHALL STREET, LONDON, E.C.

LORD DOUGLAS'S

(EARL OF HUME'S)

LESMAHAGOW

MAIN SEAM CANNEL COAL.

CRAIGNETHAN GAS COAL CO.,

LESMAHAGOW, N.B.

Analysis and Price on Application.

WYLAM WOOD COAL COMPANY,

LIMITED,

WYLAM-ON-TYNE.

WYLAM WOOD CANNEL COAL WORKED FROM ABOVE COLLIERY.

Analysis—10,280 cubic feet of gas per ton of Coal, having an Illuminating Power of 26·2 Sperm Candles, and yields 13¼ cwt of Coke per ton of Coal.

PORTS OF SHIPMENT:

TYNE DOCK AND NORTH DOCK, SUNDERLAND.

For prices and further particulars, apply to

UTRICK ALEXANDER RITSON,

6, QUEEN STREET,

NEWCASTLE-ON-TYNE.

AXWELL COLLIERY COMPANY,

Near **NEWCASTLE-ON-TYNE,**

SUPPLY CANNEL COAL FROM THE ABOVE COLLIERY.

Analysis—10,000 cubic feet of Gas per ton of Coal, having an illuminating value equal to 26 standard sperm candles, with a yield of 13½ cwts. of Coke per ton of Coal.

Supply also Gas and Coking Coals from the best seams.

Shipments at Tyne Dock and South Dock, Sunderland.

FOR PRICES AND FURTHER PARTICULARS,

APPLY TO

H.W. DODD & CO., 33, Quayside, Newcastle-on-Tyne,

OR TO THEIR LONDON AGENTS,

THOS. BROCKELBANK & CO., 115, Leadenhall St.,

LONDON.

TURNBULL, ROTBERG, & CO.,

LEITH,

SHIPPERS OF ALL DESCRIPTIONS OF

GAS AND STEAM COALS.

LONDON AGENT:

Mr. G. A. BARTLEET,

8, UNION COURT, OLD BROAD STREET.

GAS COAL.

POPE & PEARSON, LIMITED, have now the authority of several of the most eminent Gas Engineers of London in stating that their Coal yields *in practical working over 10,000 cubic feet of gas, with an illuminating power of 16 candles;* or by the standard burners now used by the London Gas Companies, an illuminating power equal to 17½ candles.

One ton yields 12½ cwt. of good coke. This Coal can be shipped from Hull, Goole, Liverpool, Morecambe, and Barrow.

For further particulars, apply to POPE AND PEARSON, LIMITED, West Riding and Silkstone Collieries, near LEEDS.

SCOTCH CANNEL COALS.

The Subscriber is prepared to contract for the supply of all the principal SCOTCH CANNEL COALS. Prices and Analyses of the various Coals will be forwarded on application.

JAMES M'KELVIE,

CANNEL COAL MERCHANT,

HAYMARKET, EDINBURGH.

Established 1840.

C. T. GRANT & CO. COAL BROKERS GLASGOW.

Scotch Churls

PRESENT PRICE:

5s. 6d. per Ton at Pit.

8s. 9d. ,, F.O.B.

Cubic Feet.	Illuminating Power.	Coke (sup. qual.).
10,000 ..	20 candles. ..	12 cwt.

C. & W. WALKER'S

WOOD PURIFIER SIEVES,

Which have now been used for twelve years, and their advantages and durability fully established. They are made entirely by steam machinery in very large quantities at the most moderate cost.

MIDLAND IRON-WORKS,

DONNINGTON, NEAR NEWPORT, SHROPSHIRE.

8, FINSBURY CIRCUS, LONDON.

CANNEL COAL.

COPPA COLLIERY, MOLD,

Beg leave to call the attention of Gas Companies to the superior quality of their

CANNEL FOR GAS-MAKING PURPOSES.

This Cannel produces in actual working, in iron retorts, 9200 cubic feet of 32-candle gas, and upwards of 11 cwt. of coke, and in clay retorts will produce 11,500 cubic feet of 25·9-candle gas.

Ports of shipment—Birkenhead or Connah's Quay.

Waggons supplied for delivery by railway to any part of England or Wales.

For particulars, prices, and rates of freight, apply to The Coppa Colliery, Mold, FLINTSHIRE.

SCOTCH GAS COAL.

ROBERT CRAWFORD & CO.,

GAS AND STEAM COAL MERCHANTS,

STIRLING, N.B.,

Supply and Contract for all the principal Scotch Gas Coal (including BOGHEAD, HARTHILL, CHAPELSIDE, LESMAHAGOW, and BRAEHEAD), f.o.b., or delivered at home or abroad.

ENGLISH AND WELSH COAL AND CANNELS ALSO SUPPLIED.

Analyses and Prices on application.

LONDON AGENT:

JOSEPH MOAKES, 6, WATER LANE, E.C.

THE

FRAMWELLGATE COAL COMPANY,

DURHAM,

Are prepared to supply their

SCREENED AND NUT GAS COALS.

This Coal yields 11,000 cubic feet of gas and 13½ cwts. of coke per ton.

OFFICES: ROYAL EXCHANGE, MIDDLESBROUGH.

GAS COAL

Of every description delivered f.o.b. United Kingdom, or cost freight and insurance Abroad, upon lowest terms.

Contracts undertaken for the Shipment, Insurance, and Delivery Abroad of Plant and Materials for Gas and Water Works, &c.

THOMAS BROCKELBANK & CO.,

Coal Exporters and Ship and Insurance Brokers,

115, LEADENHALL ST., LONDON.

THOMAS ALLAN & SONS, of Springbank Iron-Works, Glasgow, manufacture small cast-iron GAS AND WATER PIPES, ½ to 6 inches, at their branch works, Stockton-on-Tees, and have at present large stock, which they are open to sell at moderate prices

G. A. BAILEY AND CO., Machinists, Manufacturers of all kinds of Indexes for Gas and Water Meters, Indicators, Tell-Tales for Turnstiles, on an improved principle. Every description of Wheel and Worm Cutting, &c.

86, Crampton Street, Newington Butts, LONDON, S.E.

N.B.—Country Orders executed with despatch.

G. J. EVESON,

GAS COAL MERCHANT,

STOURBRIDGE.

Delivery per Rail to any Part.

MESSRS. NEWTON, CHAMBERS, & CO.,

THORNCLIFFE IRON-WORKS AND COLLIERIES,

NEAR SHEFFIELD,

STRONGLY RECOMMEND A TRIAL OF THEIR

CELEBRATED SILKSTONE GAS NUTS.

Analysis by F. J. EVANS, Esq., Chartered Gas Company, Horseferry Road, Westminster:—

(COPY.)

	Cubic Feet of Gas per Ton of Coal.	Illuminating Power in Candles.	Coke per Ton of Coal used.	Ash in Coke, per Cent.	Sulphur in Coal, per Cent.
Silkstone Nuts . . .	10·800	15·85	12·66 cwt.....	6·0	0·69

NOTE.—The illuminating power of the gas was tested by the standard burner now used in London by the Gas Referees, under the City of London Gas Act, 1868.

Horseferry Road, Westminster, March, 1870. (Signed) F. J. EVANS.

These Nuts are extensively used by various Gas Companies throughout the Kingdom, who bear strong testimony to their value.

APPLICATIONS FOR PRICES, &c., TO BE SENT DIRECT TO THE COLLIERY, AS ABOVE.

GAS PURIFICATION & CHEMICAL Co., LIMITED,

(Successors to JOHN WILLIAM O'NEILL & CO.,)

Offices—PALMERSTON BUILDINGS, OLD BROAD STREET, LONDON, E.C.,

CONTRACTORS FOR GAS PURIFICATION BY OXIDE OF IRON.

The superiority of the material supplied by this Company is generally recognized, and it is now in use in nearly all the London and most of the large Provincial Gas-Works.

JOHN WILLIAM O'NEILL, SAMUEL H. JOHNSON, } Joint Managing Directors.

ALBERT GAS COAL.

THE DERBYSHIRE

SILKSTONE COAL COMPANY, LIMITED,

CAN OFFER A

GAS COAL

Of superior quality, delivered at any station in England and Wales.

Purified gas per ton of coal in cubic feet (average)	10,775
Weight of coke in lbs. per ton of coal	1,465

ANALYSIS AND PRICES ON APPLICATION TO

Mr. EDMUND TAYLOR, Secretary,

ALBERT COLLIERY, NEWBOLD, NEAR CHESTERFIELD.

THE LOCHORE AND CAPLEDRAE CANNEL COAL COMPANY, LIMITED.

Works: LOCHORE by LOCHGELLY, FIFESHIRE. Office: 19, MAITLAND STREET, EDINBURGH.

This Company request attention to the very superior quality of their Cannel Coals.

1. The following are the practical results given by Dr. Wallace, of Glasgow, of analyses of their Lochore and Capledrae Cannels:—

	Sample worked at Capledrae.	Sample worked at Lochore
Gas per ton of coal, at 60° Fahr. and 30 inches barometric pressure . .	13,095 cubic feet.	11,760 cubic feet.
Illuminating power, in standard sperm candles, by union jet consuming 5 cubic feet per hour, at ·5-inch pressure	32·91	34·83
Value of 1 cubic foot of gas in grains of sperm	780	836
Equivalent of a ton of coal in pounds of sperm candles	1,459	1,404
Durability of 1 cubic foot by 5-inch flame	69 minutes.	71 minutes.
Gravity of the gas (air = 1000)	596	594

Remarks.—This (the sample from Capledrae) is a Cannel Coal of first-class quality, giving 13,000 feet of 33-candle gas. It contains only a minute proportion of sulphur, and the ash is almost quite white. The coke is of rather inferior quality.

Remarks on Sample from Lochore.—This is a Cannel Coal of first-class quality, giving a large yield of very rich gas and a coke of medium quality.

2. The following are the practical results of analyses by Dr. Wallace of the Company's Waverley Cannels:—

	Capledrae Waverley.	Lochore Waverley.
Gas per ton of coal, at 60° Fahr. and 30 inches barometer	9,120 cubic feet.	11,145 cubic feet.
Illuminating power, in standard candles, by union jet consuming 5 cubic feet per hour, at ·5-inch pressure	36·62	33·09
Value of 1 cubic foot of gas in grains of sperm	878	794
Equivalent of a ton of coal in pounds of sperm candles	1,145	1,264
Durability of 1 cubic foot of gas by 5-inch flame	80 minutes.	67 minutes.
Gravity of the gas (air = 1000)	677	597

Remarks on the Sample of Capledrae Waverley.—This Coal gives fully 9000 feet of gas of 36½ candles, and is admirably adapted for bringing up the quality of gas made from common coal or inferior qualities of cannel. The tests were made at a rather high temperature, this being one of the coals that stand a very high heat without serious diminution of the illuminating power of the gas The coke contains 60 per cent. of ash, and is therefore almost valueless, but the proportion of sulphur is very moderate.

Remarks on the Lochore Waverley.—This is a first-class Cannel Coal, giving 11,000 cubic feet of 33-candle gas. The quantity of sulphur is very minute, and the ash is nearly white. The coke is of inferior quality, but not wholly valueless.

Applications for full Copies of Analyses and Prices may be made to the Company, at

19, MAITLAND STREET, EDINBURGH.

CROLL'S
DRY GAS-METERS,

PRIZE MEDALS.
LONDON, 1851;
NEW YORK, 1853;
PARIS, 1855.

(INVENTED & PATENTED IN 1844,)

COMBINING ALL THE LATEST IMPROVEMENTS,

MANUFACTURED ONLY BY

PRIZE MEDALS.
LONDON, 1862;
DUBLIN, 1865;
PARIS, 1867

THE GAS-METER COMPANY, LIMITED,

238, KINGSLAND ROAD, LONDON, N.E.

ALEXANDER WRIGHT & CO.,

MANUFACTURERS OF

"WET" & "DRY" GAS-METERS

Of the highest excellence.

STATION-METERS AND GOVERNORS.

STREET-LAMP REGULATORS.

TESTING APPARATUS

Of the most perfect description for all purposes relating to Gas.

"GAS MEASUREMENT AND GAS-METER TESTING," by F. W. HARTLEY, A. Inst. C.E.
Third Edition, cloth boards, 2s.; per post, 2s. 2d.

55 and 55A, MILLBANK STREET, WESTMINSTER, S.W.

R. LAIDLAW AND SON,

EDINBURGH AND GLASGOW.

Manufacturers of

CONSUMERS IMPROVED WET GAS-METERS,

THE UNVARYING WATER-LINE GAS-METERS,

IMPROVED DRY GAS-METERS, in Cast-Iron or Tin-Plate Cases;

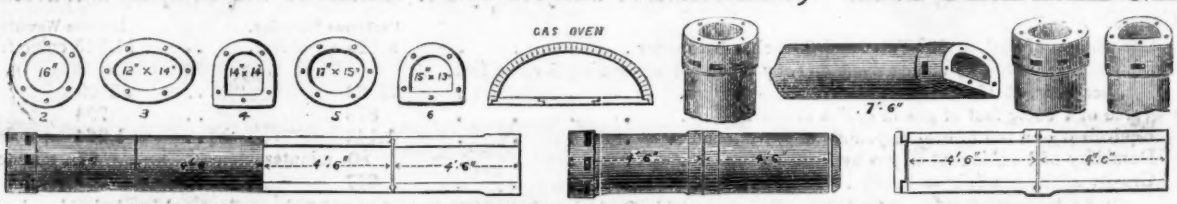
STATION-METERS, ALL SIZES, up to 15 feet Square, with PLANED JOINTS;

Experimental Meters, Photometers, Pressure-Gauges,
Governors, Test Holders, &c., &c.

LONDON OFFICE: 106, CANNON STREET, E.C.

HARRIS & PEARSON,

FIRE-CLAY AND BRICK WORKS, STOURBRIDGE.



GAS-RETORTS, LUMPS, TILES, & FIRE-BRICKS,

OF EVERY DESCRIPTION.

A LARGE ASSORTMENT OF GAS-RETORTS IN STOCK.

STOCK FOR EXPORT READY AT THE WORKS, AND AT ELLESMERE PORT.

London: Printed by WILLIAM BOUGHTON KING (at the office of Clayton and Co., 17, Bouverie Street, Fleet Street); and published by him at No. 11, Bolt Court, Fleet Street, in the City of London.—Tuesday, November 2, 1875.